technical note technical note

Integrated Terminal Weather System (ITWS) Test and Evaluation Master Plan (TEMP)

William E. Benner
Thomas M. Weiss

October 1995

DOT/FAA/CT-TN95/48

Document is on file at the Technical Center Library,
Atlantic City International Airport, New Jersey 08405.

U.S. Department of Transportation
Federal Aviation Administration
Technical Center
Atlantic City Airport, NJ 08405

NOTICE

AD NUMBER	DATE 11/8/95	DTIC ACCESSION NOTICE
1. REPORT IDENTIFYING INFORMATION	95 0291	REQUE...
A. ORIGINATING AGENCY FAA Technical Center Atlantic City International Airport, NJ		1. Put yo... on reve...
B. REPORT TITLE AND/OR NUMBER Integrated Terminal weather system (ITWS) Test and...		2. Comple... 3. Attach f... mailed
C. MONITOR REPORT NUMBER DOT/FAA/CT-TN95/48 Benner, W. et al.		4. Use unc... inform...
D. PREPARED UNDER CONTRACT NUMBER		5. Do not c... for 6 to
2. DISTRIBUTION STATEMENT UNLIMITED AVAILABILITY		DTIC: 1. Assign A... 2. Return t...

19951114 112

DTIC Form 50 DEC 91

PREVIOUS EDITIONS ARE OBSOLETE

Technical Report Documentation Page

1. **Report No.** DOT/FAA/CT-TN95/48	2. **Government Accession No.**	3. **Recipient's Catalog No.**
4. **Title and Subtitle** Integrated Terminal Weather System (ITWS) Test and Evaluation Master Plan (TEMP)		5. **Report Date** October 1995
		6. **Performing Organization Code**
7. **Author(s)** William E. Benner and Thomas M. Weiss; Jim Olivo, Basic Commerce Industries, Inc (BCI); Gloria Yastrop and Anastatia Merkel, Dimensions International, Inc.		8. **Performing Organization Report No.** DOT/FAA/CT-TN95/48
9. **Performing Organization Name and Address** U.S. Department of Transportation Federal Aviation Administration Technical Center Atlantic City International Airport, NJ 08405		10. **Work Unit No (TRAILS)**
		11. **Contract or Grant No.**
12. **Sponsoring Agency Name and Address** U.S. Department of Transportation Federal Aviation Administration Technical Center Atlantic City International Airport, NJ 08405		13. **Type of Report and Period Covered** Technical Note
		14. **Sponsoring Agency Code**
15. **Supplementary Notes**		

16. **Abstract**

This Integrated Terminal Weather System (ITWS) Test and Evaluation Master Plan (TEMP) lays the foundation for the ITWS test strategy, resources, implementation and organization responsibilities. The test efforts governed by this TEMP will ensure that ITWS meets the system and subsystem requirements allocated to the project as defined by the NAS-SS-1000, NAS-SR-1000, Operational Requirements Document (ORD) and FAA-E-2900 (ITWS System Specification). This TEMP further describes the Test and Evaluation (T&E) components for meeting program objectives for each acquisition phase. ITWS will follow the procedures for Operational Test and Evaluation (OT&E) stated in Federal Aviation Administration (FAA) Order 1810.4B. The TEMP format is in accordance with FAA-STD-024b.

This document was approved by the Test Policy and Review Committee (TPRC) on July 27, 1995, in preparation for Key Decision Point 3 (KDP-3) and the system limited production phase.

17. **Key Words** Integrated Terminal Weather System (ITWS) Test and Evaluation Master Plan (TEMP) Operational Test and Evaluation (OT&E)	18. **Distribution Statement** Document is on file at the Technical Center Library, Atlantic City International Airport, NJ 08405

19. **Security Classif. (of this report)**	20. **Security Classif. (of this page)**	21. **No of pages**	22. **Price**
Unclassified	Unclassified	149	

TABLE OF CONTENTS

APPENDIXES

LIST OF ILLUSTRATIONS

LIST OF TABLES

EXECUTIVE SUMMARY

This Test and Evaluation Master Plan (TEMP) was approved by the Test Policy and Review Committee (TPRC) on July 27, 1995, in preparation for the system limited production phase of Key Decision Point 3 (KDP-3). This document addresses the testing requirements for the Initial Operational Capability (IOC) of the Integrated Terminal Weather System (ITWS) program. An updated TEMP will be developed with additional detail as the program progresses through KDP-4, to ensure compliance with program objectives. Subsequent versions of this TEMP will be submitted for approval by the TPRC. The results of both Development Test and Evaluation (DT&E) and Operational Test and Evaluation (OT&E) testing will be utilized as input for a deployment recommendation decision.

This ITWS TEMP lays the foundation for the ITWS test strategy, resources, implementation and organization responsibilities. The test efforts governed by this TEMP will ensure ITWS meets the system and subsystem requirements allocated to the project as defined by the NAS-SS-1000, NAS-SR-1000, Operational Requirements Document (ORD) and FAA-E-2900 (ITWS System Specification). This TEMP further describes the test and evaluation components for meeting program objectives for each acquisition phase. ITWS will follow the procedures for OT&E stated in Federal Aviation Administration (FAA) Order 1810.4B. The ITWS program has been designated for ATQ, Independent Operational Test and Evaluation (IOT&E) Oversight. The TEMP format is in accordance with FAA-STD-024b.

The ITWS procurement will meet Mission Need Statement (MNS) requirements by using Commercial-Off-The-Shelf (COTS) hardware and Government Furnished Equipment (GFE) algorithms for ITWS product generation. The ITWS program completed the Demonstration Phase as defined by FAA Order 1810.1F, and is into KDP-3. The development and approval of this TEMP supports the KDP-3 decision to progress to the next phase.

The ITWS integrates weather data from terminal area sensors to provide value-added, real-time products useable without meteorological interpretation. ITWS products will be tailored for immediate use by terminal air traffic controllers, traffic managers, and automated traffic management systems. There are 34 systems planned for deployment.

Demonstration/Validation (DEMVAL) OT&E took place in Dallas Fort Worth and Orlando in 1993 and in Memphis and Orlando in 1994. OT&E Integration and OT&E testing is planned to begin in the 1998 timeframe and will occur at the FAA Technical Center, simple site airport (e.g., single sensors) and complex site airport (e.g., multiple sensors). OT&E is planned to be completed during the 1st quarter 1999.

1. INTRODUCTION.

1.1 BACKGROUND.

This Integrated Terminal Weather System (ITWS) Test and Evaluation Master Plan (TEMP) lays the foundation for the ITWS test strategy, resources, and implementation responsibilities. The test efforts governed by this TEMP will ensure the ITWS meets the system and subsystem requirements allocated to the project in the NAS-SS-1000, NAS-SR-1000, and FAA-E-ITWS (ITWS System Specification). This TEMP further describes the Test and Evaluation (T&E) components for meeting program objectives for each acquisition phase. The ITWS will follow the procedures for Operational Test and Evaluation (OT&E) stated in FAA Order 1810.4B. The TEMP format is in accordance with FAA-STD-024b.

The ITWS integrates weather data from terminal area sensors to provide value-added, real-time products that need no meteorological interpretation. ITWS products will be tailored for immediate use by terminal air traffic controllers, traffic managers, and automated traffic management systems. There are 37 systems planned for development (34 operational/3 test/training).

The ITWS procurement will meet Mission Need Statement (MNS) requirements by using Commercial-Off-The-Shelf (COTS) hardware and Government Furnished Equipment (GFE) algorithms for ITWS product generation. Additionally, the software used by the Massachusetts Institute of Technology Lincoln Laboratory (MIT/LL) to implement the algorithms will be supplied to the contractor as Government Furnished Information (GFI). The ITWS program has received conditional KDP-3 approval. Final approval is contingent on the ITWS TEMP being approved.

This TEMP addresses the testing requirements for the Initial Operational Capability (IOC) of the ITWS program. An updated TEMP will be developed with additional detail as the program progresses, through KDP-3 and KDP-4, to ensure compliance with program objectives. This TEMP and subsequent versions will be submitted for approval by the Test Policy Review Committee (TPRC). The results of both Development Test and Evaluation (DT&E) and OT&E testing will be utilized as input for a deployment recommendation decision.

Demonstration/Validation (DEMVAL) OT&E took place in Dallas/Fort Worth (DFW) and Orlando (MCO) in 1993, and in Memphis (MEM) and MCO in 1994. Additional evaluations in the operational environment are scheduled at the DFW metroplex for the summer of 1995. These DEMVALs mitigated risk by allowing the user and test community to evaluate ITWS product suitability, usefulness, and meteorological validity in an operational environment and determined the feasibility to proceed to full-scale development.

The results of the demonstration phase OT&E verified that the weather products are acceptable to the user community.

Real-time source weather information, interfaces and test data sets generated by a contractor built Test Tool, are planned to be used as input for weather scenarios at first article sites. OT&E testing is planned to begin in the 1998 timeframe at the FAA Technical Center and at simple (e.g., single airport and single weather radar inputs) and complex (e.g., multiple airports and multiple radar inputs) airports. OT&E is planned to be completed during the 1st quarter 1999.

The ITWS project (CIP 63-21) is a Level I major system acquisition which will provide coverage for the 45 airports having Terminal Doppler Weather Radar (TDWR). Some of these airports are supported from one common Terminal Radar Approach Control (TRACON) facility or a Metroplex Control Facility (MCF); therefore, only 34 operational ITWS processing elements will be required. The ITWS program has been designated for oversight by the Office of Independent Operational Test & Evaluation (IOT&E) per FAA Order 1810.1F.

The National Airspace System Change Proposal (NCP) 17331 dated April 13, 1995, and the Operational Requirements Document (ORD), dated February 1995 were the primary source documents used for the development of this TEMP.

1.2 PURPOSE.

The purpose of this TEMP is to define the overall T&E strategy necessary to ensure the successful integration of the ITWS into the National Airspace System (NAS) and to assure the operational suitability and effectiveness of the ITWS. This TEMP describes the T&E processes that will be used to ensure the ITWS meets the user and system requirements and is operationally ready.

The ITWS TEMP test strategy includes: (1) defining test methodology; (2) verifying requirements, Critical Operational Issues (COI), Critical Performance Parameters (CPP), and Minimum Acceptable Operational Performance Requirements (MAOPR), and (3) identifying organizational roles and responsibilities. ITWS COIs, CPPs, and MAOPRs are defined in the ITWS ORD. This TEMP is developed in accordance with FAA Order 1810.4B and FAA-STD-024b. A Verification Requirements Traceability Matrix (VRTM) containing high-level functional and performance requirements to be tested during the ITWS T&E program is included in appendix A.

1.3 SCOPE.

This ITWS TEMP specifically addresses the IOC ITWS which will be tested during the Development Phase and subsequent Production Phase. The FAA T&E overview begins with the MNS and continues

through Production Acceptance Test and Evaluation (PAT&E). The testing that has taken place during the Demonstration Phase and the testing that will be performed during the Development Phase will ensure that the IOC ITWS satisfies KDP-3 exit criteria, NAS-SS-1000 Specifications, MAOPR, and CPP requirements.

The FAA Technical Center will be used for the initial phase of OT&E testing. The testing done on the system at the FAA Technical Center will assure NAS interfaces and operational functionality before the ITWS is placed in an operational field site.

OT&E Operational and Shakedown testing will be conducted at two operational field sites. The selected simple and complex site will offer a broad spectrum of convective activity including both air mass differentials and frontal systems. The simple site will assess the minimum interface functionality, while the complex site will assess the interfaces with multiple airports and radar systems within an operational environment. Both sites will assess the interface functionality, operational effectiveness, and suitability within an air traffic environment. In addition, the contractor's implementation of the algorithm will be verified during the entire test cycle.

The KDP-2 ITWS Acquisition Memoranda did not identify any technical capabilities that had to be met prior to entering KDP-3. In addition, since the operational capabilities demonstrated during Demonstration Phase OT&E are not commercially available, there is no value to performing an Operational Capability Demonstration (OCD).

2. REFERENCE DOCUMENTS.

The following specifications, standards, publications, orders, and other miscellaneous documents were used in preparation of this document as well as subsequent lower level test documents and test reports.

FAA DOCUMENTS

FAA Specifications

NAS-SS-1000	NAS System Specification Volume I, Functional and Performance Requirements for the National Airspace System General.
NAS-SS-1000	NAS System Specification Volume II, Air Traffic Control Element Requirements for the National Airspace System.

NAS-SS-1000	NAS System Specification Volume III, Functional and Performance Requirements for the Ground-to-Air Element.
NAS-SS-1000	NAS System Specification Volume IV, Functional and Performance Requirements for the NAS Communications Element.
NAS-SS-1000	NAS System Specification Volume V, Functional and Performance Requirements for the National Airspace System Maintenance and Operations Support Elements.
NAS-SR-1000	NAS System Requirements Specification.
NCP 17331	NAS Change Proposal, April 13, 1995.
FAA-E-ITWS	Specification for the Integrated Terminal Weather System, March 1995.

FAA Standards

FAA-STD-021	Configuration Management [Contractor Requirements], August 17, 1987.
FAA-STD-024b	Preparation of Test and Evaluation Plans and Test Procedures, August 22, 1994.
FAA-STD-026	NAS Software Development, August 4, 1993.
FAA-STD-039	NAS Open Systems Architecture and Protocols, October 28, 1991.
FAA-STD-047	National Airspace System (NAS) Open Systems Interconnection (OSI) Conformance Testing, December 1993.

Other FAA Publications

NAS-MD-793A	Remote Maintenance Monitoring System Functional Requirements for the Remote Monitoring Subsystem (RMS).
FAA Order 1800.8F	NAS Configuration Management, May 20, 1991.
FAA Order 1810.1F	FAA Acquisition Process, March 19, 1993.
FAA Order 1810.4B	FAA NAS Test and Evaluation Policy, October 22, 1992.

ITWS ORD	Integrated Terminal Weather System Operational Requirements Document (ORD), February, 1995.
Risk Management	Integrated Terminal Weather System (ITWS) Risk Management Plan (Draft) September 1994.

Interface Documents.

NAS-IR-25082514	Interface Requirements Document, AWOS Data Acquisition System to the Integrated Terminal Weather System (ADAS/ITWS), April 3, 1995.
NAS-IR-25142513	Interface Requirements Document, Integrated Terminal Weather System to the Data Link Processor (ITWS/DLP2A), April 3, 1995.
NAS-IR-31052514	Interface Requirements Document, Integrated Terminal Weather System to Terminal Doppler Weather Radar (TDWR/ITWS), Part One, Draft, April 26, 1995.
NAS-IR-31052514	Interface Requirements Document, Integrated Terminal Weather System Situation Display to Terminal Doppler Weather Radar (TDWR SD/ITWS), Part Two, Draft, April 18, 1995.
NAS-IR-TBD	Interface Requirements Document, Airport Surveillance Radar - Model 9 (ASR-9) Weather Channel with the Integrated Terminal Weather System (ITWS) ASR-9 (Weather Channel)/ITWS, Draft, February 15, 1994.
NAS-IR-43020001c	National Airspace Data Interchange Network (NADIN)X.25 Packet Mode Users Interface Requirements Document, March 1992. (Appendix for Users, March 1995).
NAS-IR-43020001c	National Airspace Data Interchange Network (NADIN)X.25 Packet Mode Users Interface Requirements Document, March 1992. (Appendix for ACF SD, March 1995).
NAS-IR-51035101	Interface Requirements Document, Remote Monitoring Subsystem/Maintenance Processor Subsystem (RMS/MPS), December 1994.
NAS-IR-43034001	Interface Requirements Document, National Weather System to NWSTG/NAS Users system, October 24, 1994.
Unisys 1208304I	Interface Control Document, for the NEXRAD/RPG/non-associated PUP, June 1993.

OTHER STANDARDS

ISO 7498	Information Processing Systems - Open Systems Interconnection - Reference Model

MILITARY STANDARDS

MIL-STD-882C	System Safety Program Requirements, March 30, 1984.
MIL-STD-470B	Maintainability Program Requirements (for System and Equipments), May 30, 1989.
MIL-STD-785B	Reliability Program for Systems and Equipment Development and Production, August 5, 1988.

MISCELLANEOUS REPORTS

SOW	ITWS Statement of Work
ACT-320 Report	ITWS Demonstration/Validation Phase OT&E Final Report, (DRAFT), February 1995.
DOT/FAA/CT-TN 95/1	Final Report for the Air Traffic Control (ATC) Operational Evaluation of the Prototype Integrated Terminal Weather System (ITWS) at Dallas/Fort Worth (DFW) and Orlando International (MCO) Airports (May - September 1993).
DOT/FAA/RD-95/7	ITWS Demonstration and Validation Operational Test and Evaluation Report, April 13, 1995.
DOT/FAA/ND-95/11	ITWS Algorithm Specification, Volume I and II, May 31 1995
Human Factors Plan	Integrated Terminal Weather System (ITWS) Human Factors Plan, March 1995.
Project Report	Integrated Terminal Weather System (ITWS) ATC-203 1992 Annual Report Lincoln Laboratory, Massachusetts Institute of Technology, September 7, 1993.

3. INTEGRATED TERMINAL WEATHER SYSTEM DESCRIPTION.

3.1 ITWS IMPLEMENTATION.

The ITWS hardware will consist of a COTS-based computer system and associated hardware (e.g., modems, racks, etc.). The ITWS Algorithm Specification developed by MIT/LL will be provided to the contractor as GFE. The software code that MIT/LL used to

implement the algorithms during the DEMVAL will be provided to the contractor as GFI.

3.2 ITWS FUNCTIONAL DESCRIPTION.

The ITWS will collect, integrate, and process weather data from FAA and National Weather Service (NWS) sensors and from aircraft in the terminal area to provide value-added, real-time products that are usable without meteorological interpretation. These products include current terminal area weather and short term (0-30 minutes) predictions of significant weather phenomena. ITWS products will be generated for immediate use and are available to air traffic control (ATC) personnel, traffic managers, supervisors, automated traffic management systems, and pilots via data link. ITWS products will also be provided to other users with defined requirements.

Figure 3.2-1 is a high level presentation of the ITWS information flow. Table 3.2-1 presents the information in greater detail for each of the ITWS products and their associated capabilities.

The ITWS will receive TDWR, ASR-9, and Next Generation Weather Radar (NEXRAD) radar data. The ITWS will integrate this data with gridded data and Meteorological Data Collection and Reporting System (MDCRS) data received via the National Weather System Telecommunication Gateway (NWSTG). Automated Weather Observing System (AWOS), Automated Surface Observing System (ASOS), Automated Lightning Detection and Reporting System (ALDARS) are received from the ASOS/AWOS Data Acquisition (ADAS). Data input, assimilation, and processing for product generation will occur in the ITWS product generator located at the TRACON building. The ITWS graphics and text products will be presented to supervisors and traffic managers on the Situation Display (SD). ITWS text products will be presented to air traffic controllers on the Ribbon Display Terminal (RBDT). The ITWS is required to:

1. Process data (real-time weather observation data), Aviation Impact Variables (AIV), and State of Atmosphere Variables (SAV). This processing includes performing data assimilation, interpolation, and running extraction and tracking algorithms.

2. Extract information from existing Aviation Weather Products (AWP) as input for generating new AWPs.

3. Provide direct or pass-through sensor data. This data can be used as received or as base data for a value added product.

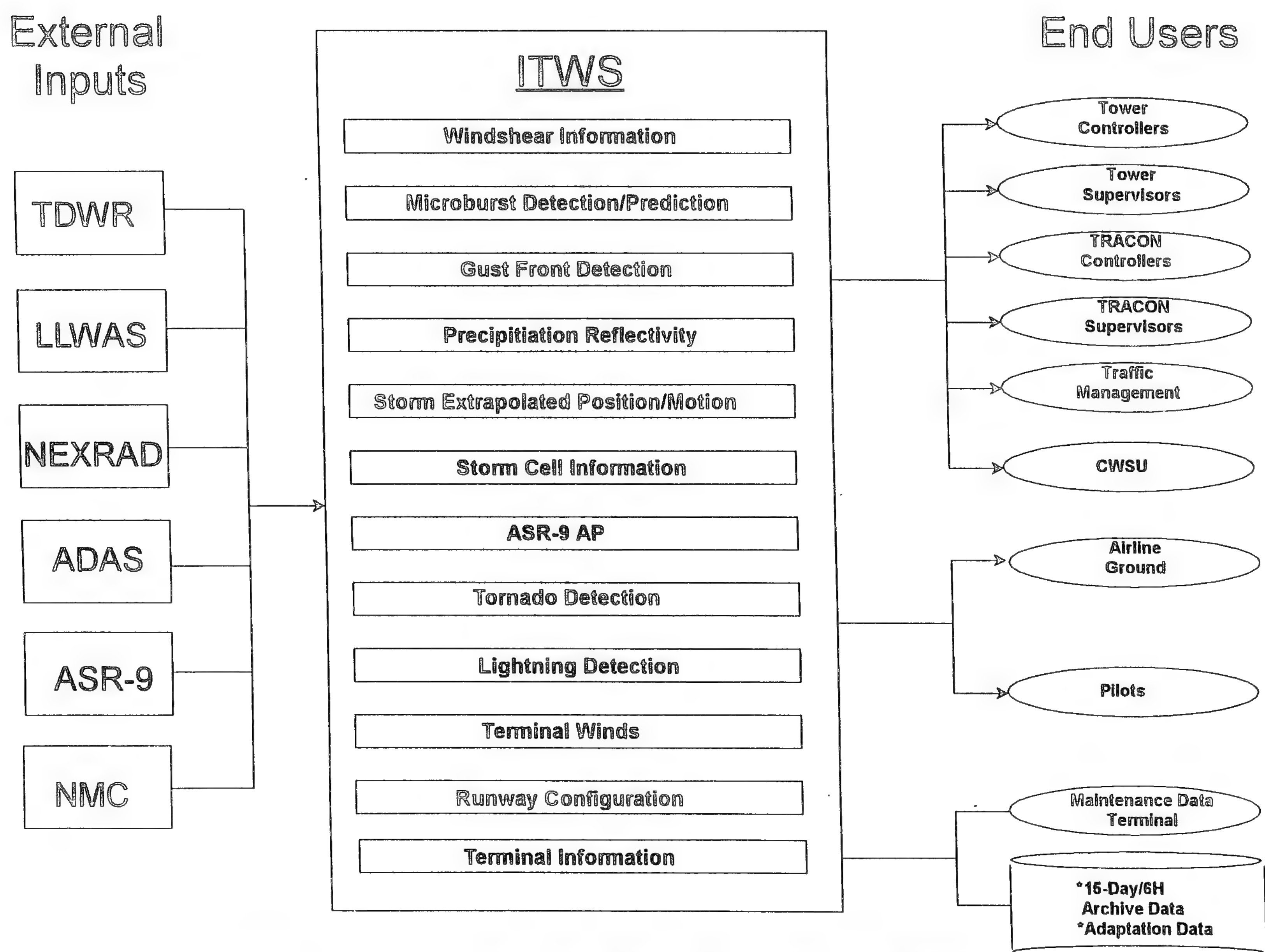

FIGURE 3.2-1. ITWS INFORMATION FLOW DIAGRAM

TABLE 3.2-1. ITWS IOC PRODUCTS

	ITWS PRODUCTS	CAPABILITY
a.	Windshear: 1) Microburst detection/prediction 2) Gust front detection and forecast 3) Ribbon display alerts 4) Microburst alert Automated Terminal Information System (ATIS) timer 5) Wind shear alert ATIS timer 6) Gust front impact timer	Accurate detection/prediction and alerting of microbursts including location, runway impact and intensity; Improved gust front detection and forecasts; Timers (ATIS/700 and Gust front impact);
b.	Gust front wind shift estimate	Estimate of wind speed and direction 10 minutes behind the gust front;
c.	Precipitation: 1) 5 nautical mile range 2) TRACON range 3) 100 nautical mile range 4) 200 nautical mile range	Precipitation intensity, location and extent in 4 ranges; TRACON precipitation with ASR-9 AP removed;
d.	Storm motion and extrapolated position: 1) 5 nautical mile range 2) TRACON range 3) 100 nautical mile range 4) 200 nautical mile range	Indication of storm speed and direction; Near-term projected storm location, and extent depicted in 4 ranges;
e.	Storm cell information: 1) 5 nautical mile range 2) TRACON range 3) 100 nautical mile range 4) 200 nautical mile range	Detailed data, on request, indicating storm features including: hail, lightning, mesocyclone and echo tops in 4 ranges;
f.	ASR-9 AP: 1) Precipitation with AP flagged 2) AP alert	Indication of location and extent of AP in the ASR-9 reflectivity; Alerting to the presence and location of ASR-9 AP;

g.	Tornado: 1) Detection 2) Alert	Indicate locations on SD in 4 ranges; Alert to the presence of tornadoes within designated distances of each ITWS airport;
h.	Airport lightning warning	Indication of lightning within designated distances of each ITWS airport;
i.	LLWAS winds	Centerfield and runway-specific winds as designated to cover each ITWS airport;
j.	Terminal winds: 1) Gridded wind field 2) Wind profile	Profiles of winds for each ITWS airport for designated reference points and altitudes for display;
k.	Runway configuration	Airport configuration (runway configuration);
l.	Terminal weather text message	Provides a textual weather message for terminal area defining pressure, weather, visibility, ceiling, winds and remarks.

3.2.1 ITWS Unique Operational and Performance Characteristics.

ITWS products are generated from data received from various input sensors and integrated into a single display and presented to end users in a form that does not require further meteorological interpretation. The ITWS will archive generated products, system status messages, and user inputs for a 15-day cycle. Additionally, the ITWS will archive acquired data used for ITWS product generation for a 6-hour period.

3.3 INTERFACES.

The ITWS will interface with various FAA and NWS weather systems to fulfill its mission requirements. ITWS interfaces are divided into two categories; input interfaces and output interfaces (users) as shown in figure 3.3-1. The following subsections describe each interface.

Each interface will achieve interoperability and compatibility using the International Standards Organization (ISO) Open System Interconnection (OSI) reference model, in accordance with ISO 7498 and FAA-STD-047. Communication architecture will be designed in accordance with FAA-STD-039. Messages and related format requirements are presented in each Interface Requirements Documents (IRD) and Interface Control Documents (ICD).

3.3.1 External Input Interfaces.

a. TDWR/ITWS

b. LLWAS/ITWS

c. ASR-9/ITWS

d. NEXRAD/ITWS

e. NMC/ITWS

f. ADAS/ITWS

3.3.1.1 TDWR/ITWS.

This is a two-part interface. For Part I, the TDWR will provide the ITWS product generator with data formatted and transmitted in accordance with NAS-IR-31052514, Part I. The data provided will include TDWR base data and Low Level Windshear Alert System (LLWAS) products.

For Part II, the TDWR will provide a direct interface to each ITWS SD in the TRACONs and Airport Traffic Control Towers (ATCT). This will provide a backup to be used by the SD and accompanying RBDTs in case of failure to receive data from the ITWS product generator. Data and protocols will be in accordance with NAS-IC-31052514 Part II.

3.3.1.2 LLWAS/ITWS.

The ITWS will interface to either LLWAS II or LLWAS III at each ITWS airport SD. The LLWAS II will provide threshold and center field wind data exclusively. The LLWAS III will supply runway oriented winds and windshear products. LLWAS data will be provided to the TDWR Radar Product Generator (RPG) for distribution to the ITWS product generator and for integration and distribution to the ITWS SD. LLWAS II/III also provides data directly to the SD as a backup to a TDWR and/or communications failure.

3.3.1.3 ASR-9/ITWS.

ASR-9 will provide digitized 6-level weather reflectivity data in accordance with the ASR-9/ITWS NAS-IR-TBD. This document is currently being updated. This IRD defines the weather data to be provided by the ASR-9. The ITWS will merge all ASR-9 inputs covering the TRACON area.

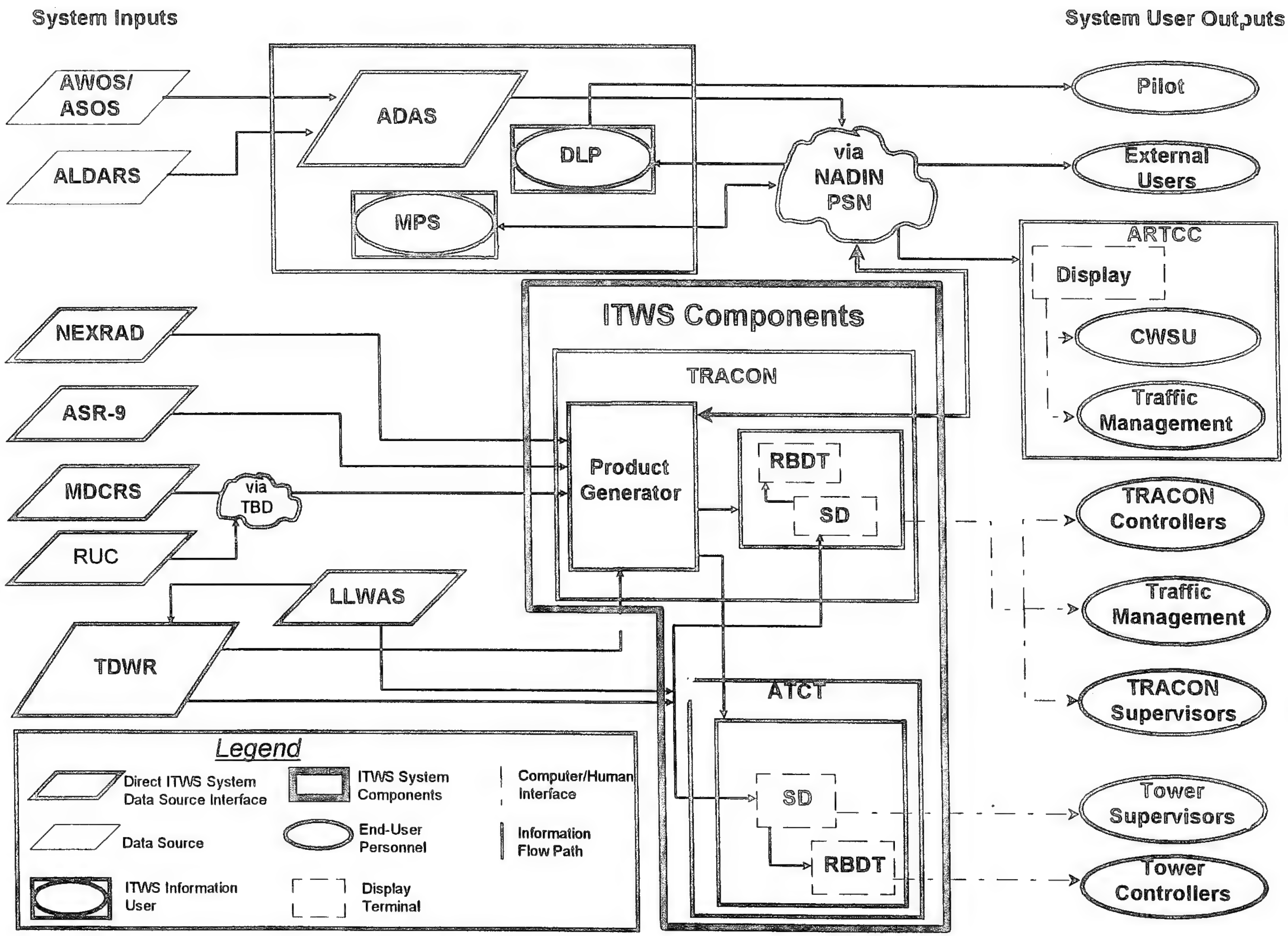

FIGURE 3.3-1. SYSTEM ARCHITECTURE

3.3.1.4 NEXRAD/ITWS.

NEXRAD will provide products in accordance with the RPG/associated Principle User Processor (PUP) ICD (Unisys 1208304I). The products will include the following data: storm structure, storm tracking, echo tops, hail index, mesocyclone, tornado vortex signature, mean radial velocity, and layered composite reflectivity. The data format and the communication protocol is defined in the NEXRAD/ITWS ICD.

3.3.1.5 NMC/ITWS.

The NWS will provide gridded data (including Rapid Update Cycle [RUC]) and MDCRS-processed airborne observations to the ITWS. The information will be broadcast via high speed communications links. The communication protocols and subnetwork communications are defined in accordance with the NWSTG/NAS User IRD (NAS-IR-43034001).

3.3.1.6 ADAS/ITWS.

ADAS will provide the ITWS with automated surface observations and lightning network information via the NADIN Packet Switching Network (PSN). The provided ADAS information will be in accordance with the NAS-IR-25082514. ADAS will provide that portion of the lightning information which falls within the geographical area of the Area Control Facility (ACF). All data exchange at the application layer is in the World Meteorological Organization (WMO) format.

3.3.2 External Output Interfaces.

The set of products disseminated from ITWS to output systems will be tailored to meet the requirements of each interface/user.

a. ITWS/External Users,

b. ITWS/Data Link Processor (DLP),

c. ITWS RMS/Maintenance Processor Subsystem (MPS),

d. ITWS/National Airspace Data Interchange Network (NADIN).

3.3.2.1 ITWS/External Users.

Output ports will be provided to transmit terminal weather products for access by external users such as airlines and the NWS. The format of messages provided over these ports will be consistent with those defined in the ITWS product generator to ITWS SD interface ICD.

3.3.2.2 ITWS/DLP2A.

ITWS products will be provided to the DLP for dissemination to pilots in accordance with NAS-IR-25142513. This interface is between the ITWS and the DLP located in each Area Control Facility (ACF). The application processes will provide only those services required for the transfer of ITWS products to the DLP (one-way operation). Interface functional requirements will be in accordance with ISO 7498.

3.3.2.3 ITWS Remote Monitoring System (RMS)/ Maintenance Processor Subsystem (MPS).

Each ITWS will incorporate an RMS, which will supply system status to the MPS. The interface will be in accordance with NAS-IR-51035101. The NAS-MD-793a provides the RMS design implementation requirements and will be used in conjunction with this IRD. The MPS and RMS application processes will exchange messages that the Remote Monitoring Subsystem (RMS) is required to provide to the MPS.

3.3.2.4 ITWS/National Airspace Data Interface Network II (NADIN II) Packet Switching Network (PSN) User.

NADIN will be used as the communications medium between ITWS and the external systems to provide the data for the exchange of messages. The requirements for the connectivity are defined in NAS-IR-43020001c.

3.4 CRITICAL PERFORMANCE PARAMETERS (CPP).

The ITWS CPPs are presented in table 3.4-1. The objectives and thresholds are extracted from the ITWS ORD. The thresholds are baselined in NAS-SS-1000 as required NAS parameters. A performance parameter's threshold is the minimum value necessary to provide an operational capability that will satisfy the mission need. Performance objectives are defined as values beyond the threshold that should reflect an operationally meaningful, measurable, and affordable improvement on operations or support beyond that provided by the threshold value.

TABLE 3.4-1. ITWS CRITICAL PERFORMANCE PARAMETERS

CRITICAL PARAMETER	THRESHOLD	OBJECTIVE
A) General Performance		
1) End-to-end availability	Essential Service for wind shear (MB, WS, & GF) requirements (end-to-end availability >/=.999)	Objective = Threshold
2) ITWS allocated availability	>/=.99981	Objective = Threshold
3) ITWS reliability	>/=2704 hours mean time between failure (MTBF)	Objective = Threshold
4) Coverage area	Surface-23,000 feet above ground level (AGL) out to 30 nm beyond the TRACON boundary, product dependent	Objective = Threshold
5) Data retention	6 hours of input data	Objective = Threshold
6) Product archiving	15 days of ITWS products directly supporting display or user output	Objective = Threshold
7) Automatic recovery on ITWS generation failure	Switch to TDWR display within 30 seconds of ITWS wind shear product outage	Objective = Threshold
8) Timeliness of reporting weather phenomenon (tornado, hail, mesocyclone)	</=1 minute of receipt of applicable data	Objective = Threshold

B) Wind shear and storm products generation performance		
1) Microburst Prediction		
a) Probability of false microburst alert	</=0.1	</=0.05
b) Prediction lead time	</=2 minutes, prior to onset of microburst for *60%* of predicted valid wet microbursts	</=2 minutes, prior to onset of divergent wind shear for *90%* of wet predicted events
2) Gust Front Forecast		
a) Predicted position time	Position predicted 10 minutes and 20 minutes in advance	Objective = Threshold
b) Predicted position accuracy	Predict *70%* of gust fronts impacting airport with wind change >/=15 knots 10 minutes in advance	Predict *90%* of gust fronts impacting airport with wind change >/=15 knots 10 minutes in advance
c) Probability of false prediction	Probability of false 10 minute prediction </= *0.10* for gust fronts with wind change>/=15 kts	Probability of false 10 minute prediction </= *0.10* for gust fronts with wind change >/=15 knots
3) Storm motion		
a) Storm speed accuracy	±5 knots for 90% of storm events moving at >/= *10* knots	±5 knots for 90% of storm events moving at >/= *5* knots
b) Storm direction	±20 degrees for *90%* of storms moving at >/= *10* knots	±20 degrees knots for 90% of storms moving at >/=*5* knots and ±*10* degrees for *50%* of storms moving at >/= *5* knots
4) Storm Extrapolated Position		
a) Extrapolated position times	Position projected 10 minutes and 20 minutes in advance	Objective = Threshold

b) Extrapolated position accuracy	*10*-minute extrapolation within 2 nm for *80%* of storms moving at speeds > 10 knots, excluding storms with growth, decay >/= 2 levels (TRACON product)	*20*-minute extrapolation within 2 nm for *70%* of storms moving at speeds > 10 knots (TRACON product)
5) Storm cell information		
a) Storm cell association	>/= *90%* of features associated to correct cell	>/= 95% of features associated to correct cell
b) Storm cell information	Threshold = Objective	Identify 80% of cells which will grow or decay by over 20% in area in next 20 minutes
6) ASR-9 AP edit		
a) Inadvertent edit	</= a maximum of $10km^2$ or 10% of contiguous area with weather reflectivity >/= level *3*	</= a maximum of $10km^2$ or 10% of contiguous area with weather reflectivity >/= level *2*
b) Latency	</=30 seconds of ASR-9 update	Objective = Threshold
c) Edit performance	Edit *70%* of AP when ASR-9 level is >/=level 3 and >/=2 levels over actual reflectivity level, & AP >/= $25km^2$	Edit 85% of AP when ASR-9 level is >/=level 3 and >/=2 levels over actual reflectivity level, & AP >/= $25km^2$
C) Winds Products generation performance		
1) Terminal winds		
a) Horizontal resolution	± *5* nm out to 30 nm beyond TRACON </= 23000 feet	± *1* nm within TRACON boundaries </= 18000 feet; 5 nm elsewhere
b) Vertical resolution (between levels)	50 millibars	25 millibars < 5000 feet AGL and </= 15 nm of the TDWR radar; 50 mb elsewhere
c) Accuracy	+10 knots 80% of time in regions and at times when both TDWR and NEXRAD have valid velocity data	+5 knots 90% of time in regions and at times when both TDWR and NEXRAD have valid velocity data

3.4.1 Exit Criteria.

Products presented in table 3.2-1 must meet the technical/operational requirements as determined by the Associate Program Manager for Test (APMT)/Integrated Product Team (IPT) reflected in the CPP list presented in table 3.4-1. The ITWS program has identified the following exit criteria for the DT&E and OT&E phases:

DT&E

a. ITWS must successfully meet and pass the technical parameters identified in the system specification FAA-E-ITWS;

b. ITWS must successfully demonstrate interface communication;

c. ITWS must successfully demonstrate performance of the contractor developed software on data sets containing various meteorological phenomena;

d. Successful Physical Configuration Audit (PCA)/Functional Configuration Audit (FCA) must be completed;

e. Rehosting of the ITWS onto new hardware must result in algorithm performance that is consistent with the functional prototype;

f. Complete documentation of all outstanding change orders, notices, and modifications or an approved plan for their completion;

OT&E

a. OT&E regression testing must be successfully completed on any incremental configuration updates during OT&E and on the final ITWS hardware/software configuration. This final configuration will include all changes required to correct deficiencies during OT&E;

b. OT&E Reliability, Maintainability, and Availability (RMA) tracking must indicate that the RMA of the ITWS is operationally satisfactory;

c. OT&E Air Traffic (AT) evaluation must be successfully performed and all operational problems identified by the controller team must be resolved or have an acceptable plan of action in place;

d. OT&E Shakedown Airway Facilities (AF) evaluations on the ITWS maintainability must be successfully performed and all identified operational problems that were identified must be resolved or have an acceptable plan of action in place;

e. Successful completion of site adaptability through testing of simple and complex sites;

f. Satisfy Pass/Fail criteria for OT&E requirements within the VRTM;

g. Demonstrate successful connection to backup modes TDWR/LLWAS.

3.5 CRITICAL OPERATIONAL ISSUES (COI).

COIs address uncertainty or risk associated with an operational system. They can be categorized into two areas: (1) operational effectiveness issues, reflecting requirements of the FAA operational user; and (2) operational suitability issues, reflecting support and maintenance requirements. The ITWS program has developed a structured approach to identify, manage, and resolve issues associated with each COI.

The mitigation of COIs is a continuing process from prototype operations (DEMVALs) throughout the procurement lifecycle. The COIs listed below include those from the ORD and the 1994 DEMVAL.

Section 5.2 represents a subset of these COIs specifically related to the 1994 DEMVAL. The DEMVALS provided a data set upon which mitigation of the COIs could be initiated. Results of the DEMVALs provide an indication of COI status. While COIs are stated as resolved for the demonstration phase, continued testing is required to assure resolution into the development phase when the contractor development system software is procured.

a. Will input sensor quality be adequate?

This COI was initially addressed during the 1994 DEMVAL in MEM and MCO. Continued assessment of this COI is needed since the prototype system was not completely representative of the production system. Not all NAS interfaces were available directly to the ITWS. These inputs were generated using alternate software algorithms which provided the data not available through the NAS inputs. Additionally, analyses using measured statistics for input availability will also be utilized. Functional prototypes at MEM, MCO, and DFW will enable additional data to be collected to assess the capability of key sensors prior to delivery of the first article ITWS.

During OT&E, the availability and performance of the input sensors at the OT&E test sites will be assessed. This testing on the first article systems will enable this COI to be assessed in an operational environment.

Input sensors utilized are expected to be commissioned by the time ITWS OT&E occurs, therefore the data quality, in general, should not be an issue. However, input data quality will be monitored to ensure data integrity. The sensor commissioning schedules will be monitored to ensure only sites with commissioned sensors are utilized.

Inherent limitations of input sensor data (Anomalous Propagation [AP], cone of silence, etc.) will be compensated for by utilizing available sensors which provide the most accurate data for a given condition. For example, TDWR reflectivity will be used for the 5-mile range (where ASR-9 tends to be less sensitive) and NEXRAD will be used to edit ASR-9 AP.

Utilizing this approach helps mitigate the sensor quality issue. The inherent limitations will be tested both in the DT&E and OT&E phases. Test scenarios will be developed to examine both raw base data for a given sensor (e.g., raw ASR-9 data) and the compensated data to verify the improved quality. Also, AT personnel will provide a qualitative evaluation for this COI.

b. Will the algorithms and hardware function properly in a large TRACON environment, with multiple TDWRs, ASR-9s, and NEXRADs?

Assessment of this COI will be conducted through evaluating the ITWS at complex sites utilizing multiple sensor inputs. The proposed test strategy defined throughout section 5. of this document will ensure that this COI is addressed.

The functional prototype at DFW in 1995 will provide background to evaluate this COI. Multiple ASR-9 data archived/recorded in 1993, by MIT/LL (for DFW) will also be analyzed. The functionality of the hardware and algorithms will then be tested by the contractor during DT&E, using the GFE algorithms and contractor's implementation of the software. Because the algorithms are provided as GFE to the contractor, these algorithms will be used as the design reference. The contractor will be required to achieve the same probability of detections (POD), probability of false alarms (PFA), etc., that have been defined in the ORD. The DT&E and OT&E testing performed will test these requirements. The phased approach of OT&E specifically tests the multisensor environment using a combination of sensors and test drivers initially at the FAA Technical Center and then at the simple and complex site configurations. This testing will provide data to assess the COI.

c. Can the effectiveness demonstrated at the DEMVAL locations be achieved at other ITWS airports given regional climatic differences, diverse airport equipage, and availability of inputs?

In order to begin addressing this COI data is continuing to be collected on the accuracy and operational effectiveness at the ITWS DEMVAL/operational sites (operated and maintained by MIT/LL).

Additionally, data obtained at DFW during the summer of 1995 will be collected and analyzed by ACT-320 to continue to assess the effectiveness of the ITWS. This data set will be an additional point to evaluate the robustness of the ITWS algorithms and their effectiveness in different regional climates.

Thereafter, data sets from other representative climate areas and diversely equipped airports will be collected and assessed for robustness as described in the paragraph below. Data will be recorded at major TDWR-equipped airports in the northeast and upper midwest during convective seasons to complement the Florida, mid-south, and southwest climatic data from the functional prototype sites.

During the contractor conducted DT&E, data sets representing the diverse climates and equipment will be tested on the contractor implemented software. Additionally, the validity of the algorithms will be verified. This verification will be conducted through two methods. First, the science panel (consisting of meteorological experts from various scientific communities) will reconvene to assess the meteorological accuracy of the science behind each algorithm. Secondly, a meteorological group consisting of representatives from organizations such as ACT-320, AOS-250, and National Severe Storms Laboratory (NSSL) will evaluate algorithm performance against expected outcome by the ITWS. This will be accomplished through the use of various product sets and conducted throughout the development test phase.

At the FAA Technical Center, live interfaces will be introduced to further test the effectiveness of the algorithms, which will be followed by simple and complex site as part of Operational and Shakedown testing. OT&E using initial ITWS articles will be carried out at two sites which are different from those selected for functional prototype testing and recorded data evaluations.

d. Can the ITWS aid in maintaining effective airport capacity during adverse weather conditions?

This COI will be addressed by demonstrating the improved effective capacity (and reduced delays) provided by the initial ITWS operating capability at operational airports. Demonstration OT&E testing using functional prototypes at MEM and MCO

demonstrated that operational procedures to utilize the ITWS products have the capability to improve effective capacity. Additional evaluations using functional prototypes at MEM, MCO, and DFW will enable additional data to be collected and the effect on capacity provided by the initial ITWS to be evaluated. This will occur prior to delivery of the first article.

ACT-320 will perform analysis on data provided by MIT/LL and AT on airport capacity prior to ITWS installation at the OT&E airports and post-ITWS installation. Before OT&E commences, airport capacity data for the sites selected will be collected and evaluated. OT&E will also use some qualitative analyses techniques (i.e., questionnaires) to augment the quantitative data analyses.

e. Are the ITWS products usable without the need for meteorological interpretation?

This COI was evaluated during the Demonstration OT&E testing using functional prototypes in MEM and MCO. Results of this evaluation indicated that controllers did not require meteorological interpretation of the products. Evaluations of ITWS prototype operations in MCO, MEM, and DFW in addition to evaluations conducted during OT&E will enable continued assessment of this COI. A strong training program will be conducted to ensure that end users fully understand the system and system functionality.

f. Is the ITWS resilient under loss of input from interfaced systems/sensors e.g., TDWR, ASR-9, Remote Maintenance Monitoring System (RMMS), and NEXRAD?

The resiliency of the ITWS will be evaluated during OT&E. Resiliency is being defined as the system's ability to recover to its full operational functionality when inputs from interfaced systems/sensors are lost and subsequently restored, within an operationally acceptable timeframe. Table 3.2-1 in the ITWS ORD addresses the impact on specific ITWS products upon input sensor failure.

This COI was initially addressed during the Demonstration Phase OT&E testing at MEM and MCO in 1994. As with other COIs, the DT&E testing using data sets and specification requirements will further mitigate the risk posed by this COI. Specific OT&E testing will be conducted at the FAA Technical Center and at the operational sites to further evaluate this COI. AF personnel will conduct testing on RMA of the ITWS system and its supporting sensors during shakedown testing.

g. Are the ITWS products suitable for AT use?

Previous Demonstration Phase OT&E testing of functional prototypes in MEM and MCO, indicated that the ITWS products are suitable for AT use. Additionally, the ITWS products have been developed in conjunction with the ITWS User Group.

To further evaluate this COI, an assessment of the ITWS products using contractor implemented software will be performed. The testing methodology (questionnaires, observations, and interviews) will be similar to that during previous DEMVALS. The testing will be conducted by ACT-320 and the data collected from questionnaires, observations, and interviews will provide information necessary to address this COI. AT representatives from various regions and facilities (TRACONs and Air Route Traffic Control Centers (ARTCC)) will travel to the DT&E and the phased OT&E simple and complex sites to utilize and evaluate the ITWS and support the overall testing effort.

h. Does the ITWS meet the critical performance threshold requirements of the ORD?

The status of this COI from the 1994 DEMVAL report is partially resolved. The prototype will continue to be monitored during 1995 at DFW, MEM,and MCO with additional analyses performed. The MIT/LL "Integrated Terminal Weather System (ITWS) Demonstration and Validation Operational Test and Evaluation" report statistics will also be examined, and DT&E data sets will further validate the threshold requirements. During OT&E using meteorological and statistical analysis output data will be compared with raw sensor data to verify product accuracy.

The scientific community accepts this method as a valid process to assess truth. The meteorological validation team will provide further independent assessment to assure resolution to this COI.

Additionally, the following testing and oversight will occur to certify the implementation of the contractor developed software algorithms:

The Science Panel will be reconvened to assure the science behind the ITWS Algorithms remains valid;

An independent group will oversee the meteorological verification of the ITWS algorithms using various product sets and assess the process throughout the Development Test phase, and;

The "A" Specification will require discrete points in the software that will allow the contractor and the government to inject data to prove the contractor's implementation of the GFE algorithms give the required results.

AF personnel from AOS-250 will also be involved during the DT&E and OT&E testing to assure this COI continues to be resolved. The above efforts should continue to assure this COI is adequately addressed.

i. Do the ITWS products enhance the effectiveness of traffic planning/management (delays, airport acceptance rate, traffic flow, etc.) during adverse conditions in the terminal area? Are terminal airspace and runways used more effectively?

This COI was initially addressed during the 1994 DEMVAL at MEM and MCO where OT&E testing using functional prototypes demonstrated that operational procedures to utilize the ITWS products improved effective capacity. Additional input using functional prototypes at MEM, MCO, and DFW will provide additional data to further examine the effective capacity provided by the initial ITWS prior to delivery of the first article. Data to address this COI for OT&E will be obtained from pre-ITWS air traffic measures and questionnaire evaluations. See item d.

j. Is the ITWS display visible under anticipated lighting conditions?

This COI will be resolved by means of specification requirements and system use within the operational environment.

k. Does the ITWS reduce (perceived) controller workload during adverse weather conditions in the terminal area?

The results of the workload scale administered to air traffic personnel in conjunction with previous Demonstration Phase OT&E testing in MEM and MCO, indicated that perceived workload was reduced during adverse weather conditions. The results of the workload scale are contained in the "ITWS Demonstration/ Validation Phase OT&E Final Report, (Draft)."

Additional workload data will be collected in conjunction with the prototype evaluation at DFW in 1995, to further verify results obtained in 1994. A workload scale will be administered at the OT&E Integration and Operational testing at the simple and complex sites.

3.6 MINIMUM ACCEPTABLE OPERATIONAL PERFORMANCE REQUIREMENTS (MAOPR).

Air Traffic Plans and Requirements Service (ATR-134.1) has identified the ITWS MAOPRs requirements; they correspond to the threshold values of the CPPs in table 3.4-1.

4. TEST & EVALUATION (T&E) PROGRAM MANAGEMENT.

4.1 MANAGEMENT.

The following subsections identify the roles and responsibilities for the organizations involved in the ITWS T&E process.

4.1.1 NAS Configuration Control Board (CCB).

a. Approves DT&E and PAT&E requirements contained in the project specification (e.g., project specification VRTM).
b. Approves test standards and definitions.
c. Approves NAS-SS-1000 NCPs and IRDs that affect system requirements.

4.1.2 Test Policy Review Committee (TPRC).

a. Supports T&E policy, test standards, and definitions.
b. Approves TPRC operating procedures.
c. Approves FAA TEMP and revisions.
d. Approves test policy waivers.
e. Resolves disagreements on T&E issues when agreements cannot be reached at lower levels of FAA management.

4.1.3 Aviation Weather Development Program, AND-460, ITWS Program Manager (PM).

a. Responsible for overall program management.
b. Presents T&E deployment issues to the Deployment Readiness Review (DRR).
c. Arranges with APMT for T&E support, coordination and monitoring through an annual Program Directive (PD).
d. Approves PD.
e. Tasks APMT to prepare PDs between the program office and other FAA organizations.
f. Requests funding for project T&E which is included in the overall program funding.
g. Responsible for receiving TPRC approval for the FAA TEMP.
h. Prepares test policy waiver requests, and submits them to the TPRC Secretariat.
i. Coordinates T&E requirements for Department of Defense (DOD), or other government agencies, on joint procurement, as the project requires.
j. Develops, or has the APMT develop, the project specification VRTM, and incorporates these requirements into the project.
k. With APMT support, brings unresolved T&E issues before the TPRC via the TPRC Secretariat.
l. Approves DT&E test plans, procedures, and reports.
m. Reviews DT&E test plans, procedures, and reports.

n. Recommends to the contract officer (CO) approval of DT&E test plans, procedures, and reports.
o. Monitors DT&E contractor conducted testing.
p. Reviews OT&E Integration and OT&E Operational test requirements, plans, procedures, and reports.
q. Approves OT&E Integration and OT&E Operational test requirements, plan, procedures, and reports.
r. Monitors OT&E Integration and OT&E Operational tests.
s. Monitors OT&E Shakedown.
t. Reviews Field Shakedown requirements with the Airway Facilities Division organization.
u. Reviews Site Acceptance Test (SAT) test plans, procedures, and reports.
v. Monitors Field Shakedown.
w. Oversees distribution for DT&E/SAT test plans, procedures, and reports.
x. Responsible for FAA TEMP distribution.
y. Responsible for identifying and prescribing appropriate distribution and accountability controls for program technology that is critical.
z. Prepares NCPs for designated test locations.

4.1.4 NAS Development Special Assistant (AND-3).

a. Member of TPRC.
b. Reviews FAA TEMP.
c. Supports development of revisions to test policy, test standards, and definitions.

4.1.5 NAS Transition and Implementation Service (ANS).

a. Member of TPRC.
b. Provides supportable requirements to the APMT for inclusion in the FAA TEMP, which serves as guidance to AOS for the OT&E plans.
c. Reviews FAA TEMPs.
d. Reviews requirements, plans, and procedures for OT&E plans.
e. Provides personnel for conducting and/or monitoring the conduct of OT&E Shakedown.
f. Reviews OT&E Shakedown reports.
g. Reviews PDs.
h. Approves PDs.

4.1.6 Communication, Navigation and Surveillance Engineering and Test Division (ACT-300).

a. Member of the TPRC.
b. Provides APMT.
c. Prepares project TEMP.
d. Reviews test plans.

e. Reviews DT&E, OT&E Integration and OT&E Operational test requirements.
f. Provides concurrence on OT&E Integration and OT&E Operational test plans and reports prior to review.
g. Presents unresolved T&E issues, significant T&E test result problems, or violations of T&E policy to the TPRC.
h. Provides T&E assessments to the DRR.
i. Provides for FAA Technical Center facility readiness.

4.1.7 Associate Program Manager for Test (ACT-320).

a. Supports development of test policy and test standards.
b. Acts as the agent of the PM to manage the T&E program; including establishing overall test schedules, coordinating tests, ensuring that all test requirements are satisfied, and that tests are performed in accordance with approved procedures.
c. Prepares, coordinates, and approves, with the PM, an annual PD which addresses all T&E task support activities and resources required for the project.
d. Prepares appropriate T&E inputs to project documentation, (e.g., project procurement package) as specifically tasked in the PD.
e. Prepares PDs between the project office and other FAA or DOD organizations to fund and/or arrange for the organizations' participation in T&E activities.
f. Jointly prepares and updates the FAA TEMP with the PM.
g. Provides updates of available test results during DRR.
h. Reviews DT&E test requirements, plans, procedures, and reports.
i. Arranges DT&E and PAT&E test support.
j. Reviews DT&E and PAT&E test requirements.
k. Coordinates with performing organizations, and monitors DT&E, OT&E, and PAT&E activities.
l. Reviews contractor-prepared DT&E and PAT&E plans, procedures, and reports.
m. Prepares DT&E and PAT&E test plans, procedures, and reports when tasked by the PM to develop hardware or software, instead of a contractor.
n. Directs and conducts DT&E testing if tasked by the PM/Associate Program Manager for Engineering (APME) and monitors DT&E testing performed by a contractor.
o. Reviews DT&E and PAT&E requirements for inclusion in the FAA TEMP.
p. Prepares OT&E Integration and OT&E Operational test requirements for inclusion in the FAA TEMP.
q. Prepares OT&E Integration and OT&E Operational test plans, procedures, and reports.
r. Reviews OT&E Shakedown requirements, plans, and procedures.

s. Directs and conducts OT&E Integration and OT&E Operational tests. AOS-250 may optionally participate in test conduct.
t. Reviews all OT&E Shakedown reports (information only).
u. Reviews Field Shakedown requirements, plans, procedures, and reports.
v. Monitors OT&E Shakedown.
w. Monitors Field Shakedown.

4.1.8 Air Traffic Plans and Requirements (ATR).

a. Member of TPRC.
b. Provides requirements for and reviews the FAA TEMP.
c. Provides operational expertise and planning for conducting and analyzing tests.
d. Reviews DT&E, OT&E, and PAT&E requirements.
e. Provides personnel to support monitoring and conduct of DT&E.
f. Reviews program PDs.
g. Provides test requirements via the FAA TEMP, supports test plan development, and reviews test plans and procedures for OT&E Integration and OT&E Operational tests.
h. Provides and approves additional test requirements (that do not exceed OT&E Shakedown durations or costs as baselined in the FAA TEMP) not identified in the TPRC-baselined FAA TEMP for OT&E Integration and OT&E Operational tests. When change or additions are required which exceed cost or schedule allotments previously planned, the normal process for adjusting the planned testing and resolving disagreements applies.
i. Determines the operational acceptability of new ATC operational computer programs or systems prior to their delivery for operational testing and use in field facilities.
j. Provides personnel for conducting and/or monitoring the conduct of OT&E Integration and OT&E Operational tests.
k. Reviews OT&E Integration and OT&E Operational test reports.
l. Provides and coordinates test requirements, supports test plan development, and reviews test plans and procedures for OT&E Shakedown.
m. Provides personnel for conducting and/or monitoring the conduct of OT&E Shakedown.
n. Reviews OT&E Shakedown reports.
o. Provides and reviews requirements, plans, and procedures for Field Shakedown.
p. Monitors the conduct of Field Shakedown.
q. Reviews Field Shakedown reports.
r. Provides a deployment recommendation based on OT&E Shakedown results, in support of the DRR.
s. Develops the ORD.

4.1.9 Operational Support Service (AOS).

a. Member of TPRC.
b. Identifies and develops with the PM and APMT, OT&E Shakedown requirements for inclusion in the FAA TEMP.
c. Optionally supplies draft PD, reviews, and approves final PD.
d. Reviews FAA TEMP.
e. Reviews OT&E Integration and OT&E Operational test requirements, plans, and reports.
f. Monitors DT&E tests.
g. Monitors OT&E Integration and OT&E Operational tests, and optionally participates in OT&E Integration and OT&E Operational test conduct.
h. Prepares OT&E Shakedown requirements, plans, procedures, and reports in coordination with ATR.
i. Approves, in coordination with ATR, additional OT&E Shakedown requirements that do not exceed OT&E Shakedown durations or costs as baselined in the TEMP.
j. Approves OT&E Shakedown plans, procedures, and reports.
k. Directs and conducts OT&E Shakedown as applicable to OT&E requirements. ATR will support and participate in those tests that are applicable to ATR OT&E Shakedown requirements.
l. Provides personnel for performing and/or monitoring the conduct of OT&E Shakedown.
m. Conducts OT&E Shakedown data analysis.
n. Provides a deployment recommendation based on OT&E Shakedown results in support of the DRR.
o. Monitors, and optionally participates, in test conduct of Field Shakedown.

4.1.10 NAS System Analysis and Integration Division (ASD-120).

a. Reviews FAA TEMP.
b. Provides the NAS-SS-1000 System Specification requirements for inclusion in the FAA TEMP VRTM, or coordinates requirements for those projects not included in the NAS-SS-1000.
c. Provide inputs to mission needs analysis that serve as the basis for various Key Decision Points.
d. Provide inputs or revised engineering documentation (specifications, Statements of Work, NCPs, TEMPs, etc.) for conformance with system engineering policies, standards, and baseline specifications.

4.1.11 System Engineering Management (ASD-140).

a. Serves as TPRC Secretariat.
b. Formulates revisions to test policy, test standards and definitions for consideration and endorsement by the TPRC.

c. Verifies compliance with FAA Order 1810.4B and standards.
d. Develops and maintains the TPRC Operating Procedures.
e. Provides and maintains implementation traceability for NAS Verification via the VRTMs contained in the NAS-SS-1000 System Specification.
f. Develops VRTMs for new NAS-SS-1000 System Specification projects and NAS IRDs.

4.1.12 Office of Independent Operational Test & Evaluation (ATQ).

a. Member of TPRC.
b. Provides independent oversight of all ITWS testing efforts.
c. Assesses operational suitability and effectiveness of the ITWS system.
d. Co-approves the TEMP.
e. Reviews and comments on DT&E and OT&E plans, procedures, and reports.
f. Provides operational readiness assessment reports to the FAA Administrator.
g. Responsible for Independent OT&E.

4.1.13 Director of Acquisitions (ASU).

a. Member of TPRC.
b. Reviews and approves PDs.
c. Reviews FAA TEMP and contractor's MTP.
d. Reviews DT&E test plans, procedures, and reports.
e. Reviews PAT&E test plans, procedures, and reports.
f. Verifies completeness of program by reviewing the final OT&E I/O testing, Shakedown and Field Shakedown reports from each site.
g. Provides Associate Program Manager for Quality (APMQ) and Quality Reliability Officer (QRO).

4.1.14 Office of Air Traffic System Management (ATM).

a. Reviews Field Shakedown requirements, plans, procedures, and reports.
b. Determines the operational acceptability of new ATC operational computer programs or systems prior to their delivery for operational testing and use in field facilities.
c. Monitors OT&E Operational testing.
d. Monitors Field Shakedown.
e. Monitors computer program implementation schedules to ensure operational requirements are met.
f. Manages requirements for new airspace management systems.
g. Reviews PDs via ATR.

4.1.15 Air Traffic Rules and Procedures Service (ATP).

a. Reviews Field Shakedown requirements, plans, procedures, and reports.
b. Monitors Field Shakedown.
c. Develops procedures for system implementation.
d. Reviews PDs via ATR.

4.1.16 Communications/Infrastructure (ACT-330).

a. Conduct RMS/MPS interface testing during OT&E Integration.
b. Develops plans, reports, and provides overall coordination for the RMS effort.

4.1.17 FAA Contracting Officer.

a. Approves DT&E and PAT&E test plans, procedures, and reports for contractual compliance.
b. Ensures DT&E tests are conducted per contract.

4.1.18 Regional Air Traffic Division.

a. Support PM via ATR in development of test requirements for inclusion in the FAA TEMP.
b. Supports PM in implementation of FAA TEMP at test and operational facilities, as required by ATR.
c. Supports AF Division in the development of Field Shakedown requirements, plans, procedures, and reports, with the inclusion of Regional AT Division objectives and interests.
d. Provides coordination to AF Division for Field Shakedown requirements, plans, procedures, and reports.
e. Participates in the conduct of OT&E Integration and OT&E Operational testing, and OT&E Shakedown, as coordinated with the ATR organization.
f. Supports Field Shakedown that is in satisfaction of Regional AT Division test requirements or objectives, as coordinated with AF Division.
g. Conducts Field Shakedown in coordination with AF Division.
h. Monitors Field Shakedown.
i. Reviews PD via ATR.

4.1.19 Air Traffic Facilities.

a. Participates in FAA TEMP activities as required by ATR through Regional AT Division.
b. Supports development of Field Shakedown requirements, plans, procedures, and reports, in coordination with facility AF organizations.

c. Conducts and monitors Field Shakedown and reports results in coordination with facility AF organizations and Regional AT Division.
d. Reviews PD via ATR and Regional AT Division.

4.1.20 Regional Airway Facilities Division.

a. Supports PM in development of test requirements for inclusion in FAA TEMP.
b. Supports PM in implementation of FAA TEMP at test and operational facilities.
c. Responsible for overall Field Shakedown, in cooperation with AT Division.
d. Co-approves, jointly with AT Division, Field Shakedown requirements with the PM.
e. Approves Field Shakedown plans, procedures, and reports.
f. Participates in the conduct of OT&E Integration and OT&E Operational testing, and OT&E Shakedown, as coordinated with AOS.
g. Directs Field Shakedown that is in satisfaction of AF Division test requirements or objectives, and as coordinated with AT Division.
h. Conducts Field Shakedown in coordination with AT Division. AOS-250 have the option of participating in test conduct.

4.1.21 Airway Facilities Sectors.

a. Participates in FAA TEMP activities as required by AF Division.
b. Develops Field Shakedown requirements, plans, and procedures, in coordination with facility AT organization.
c. Conducts Field Shakedown, including Joint Acceptance Inspection (JAI), and reports results in coordination with facility AT organization.

4.1.22 Test Plan Working Group (TPWG).

a. Meet periodically to discuss test related issues concerning the TEMP, DEMVALs, OT&E schedules, and other related issues.
b. Provide input for test requirements and represent respective organizations regarding acceptance of test responsibilities and input for test requirements.
c. Provides input into the preparation of test plans and test requirements.

4.1.23 MIT/LL.

a. Provide support to the ITWS prime contractor as requested by AND-460.
b. Provide technical support/meteorological background on algorithms.
c. Provide support to AND-460 and ACT-320 during overall test effort on the technical and scientific background of the ITWS during the development and production phase.
d. Operate ITWS functional prototypes in support of Development OT&E Testing at MEM, MCO, and DFW.

4.2 INTEGRATED SCHEDULE.

Appendix B contains the ITWS Integrated Test Schedule which details the sequential relationship of all T&E events and milestones relative to the key acquisition events of the program. System development will begin in the 1996 timeframe with OT&E beginning in 1999. The schedule will be updated as confirmed dates become available.

Key milestones of the schedule are the Preliminary Design Review (PDR), Critical Design Review (CDR), DT&E, Test Readiness Review (TRR), Contract Acceptance Inspection (CAI), and first Operational Readiness Demonstration (ORD). The PDR is an early opportunity for the FAA to examine the high-level design of the contractor developed system. The contractor will present the detailed design to the FAA at the CDR. At this point, the program can move into the software development phase. The DT&E phase will present the FAA with a series of opportunities to monitor development. DT&E will commence immediately after successful TRR. The TRR will indicate the preparedness for the Factory Acceptance Testing (FAT), which will transition the system from the factory to an operational site. The system transition of ownership from the contractor to the FAA occurs at CAI. The first ORD is part of Field Shakedown Testing and precedes system commissioning.

4.3 ITWS TEST AND EVALUATION FUNDING.

The funding profile estimated to support test and evaluation through fiscal year 2001 is presented in table 4.3-1.

TABLE 4.3-1. ITWS TEST AND EVALUATION FUNDING

ITWS T&E Funding							
FY	96	97	98	99	00	01	TOTAL
Testing Phase							$/Test Phase
Development T&E (96-99)	950 K	1150 K	1150 K	200 K	0 K	0 K	3450 K
OT&E (97-01)	0 K	160 K	*870 K	1440 K	620 K	0 K	**3090 K
PAT&E (00-01)	0 K	0 K	0 K	0 K	600 K	810 K	1410 K
Total Program $/FY	950 K	1310 K	2020 K	1640 K	1220 K	810 K	7950 K

* Includes 500 K for PSF physical expansion

** Includes funding for Material Resources (communication lines, modems and test support equipment)

4.4 TEST PLANS.

Table 4.4-1 lists the Development Phase test plans, expected completion dates, and responsible organizations.

TABLE 4.4-1. DEVELOPMENT PHASE TEST PLANS

Development Phase Test Plans		
Document Title	Expected Completion Date	Responsible Organization
FAA TEMP	Apr-95	ACT-320
Human Factors Plan	Mar-95	ACT-320
FAA OT&E Operational and Integration Test Plan	Jun-99	ACT-320
OT&E Shakedown Test Plan	Jul-99	AOS-200
IOT&E Plan	TBD	ATQ/AT
Contractor's Master Test Plan (CMTP)	TBD	Development Contractor
Software Test Plan (includes DQT/FQT)	TBD	Development Contractor
DT&E FAT Plan	TBD	Development Contractor
DT&E SAT Plan (includes Delta DT&E Test requirements)	TBD	Development Contractor
PAT&E FAT Plan	TBD	Development Contractor
PAT&E SAT Plan	TBD	Development Contractor
Reliability Test Plan	TBD	Development Contractor
Maintainability Test Plan	TBD	Development Contractor

4.4.1 Government Test Plans.

A set of test plans will be developed by the organizations responsible for each T&E phase identified within this TEMP. Test plans define the range of tests to be performed, input data, initialization requirements, expected output, qualitative methods and criteria for evaluating test results.

4.4.1.1 FAA TEMP.

The FAA TEMP is written by the government and is in accordance with FAA-STD-024b, 1810.4b, and 1810.1f. This document details the overall test philosophy throughout the DT&E, OT&E, and PAT&E test phases.

4.4.1.2 Human Factors Plan.

The Human Factors Plan is prepared by the government and outlines the proposed approach and methodology utilized to address human engineering issues throughout the acquisition cycle. This plan will drive all test and evaluation efforts regarding operator performance and display issues.

4.4.1.3 FAA OT&E Operational and Integration Test Plan.

This plan is prepared by the government and is used to ensure that the NAS requirements are thoroughly tested. It will also test the system to verify that interfaces between existing NAS systems are not degraded due to the introduction of the new system. The plan will also address how operational effectiveness and suitability of the system will be evaluated.

4.4.1.4 OT&E Shakedown Test Plan.

The OT&E Shakedown Test Plan defines the OT&E testing within the operational environment. This testing will also verify the readiness of personnel and procedures with respect to the system.

4.4.2 Contractor Test Plans.

The contractor will develop a series of test plans to successfully test the system through the DT&E and PAT&E test phases.

4.4.2.1 Contractor Master Test Plan (CMTP).

The CMTP defines the overall test philosophy of the contractor and summarizes tests required to be conducted by the contractor in the DT&E and PAT&E test phases. It details the methods for implementing and controlling the various testing programs.

4.4.2.2 Software Test Plan (STP).

The STP defines the scope of testing to be conducted at the software development level. It will provide plans for unit tests, computer software components and computer software configuration items. The testing will validate the major ITWS system components of communications, processing and control. Additionally, this plan will define software test cases and post-conduct analysis to determine the effectiveness of the GFE (meteorological algorithms). The software test plan includes planned testing for DT&E DQT and DT&E FQT.

4.4.2.3 DT&E Factory Acceptance Test (FAT) Plan.

The DT&E FAT Plan is prepared by the contractor and details the pre-delivery system testing to be conducted by the contractor within the their facility. This testing will be conducted on the first article systems. This plan will contain the pass/fail criteria for the specification requirements.

4.4.2.4 DT&E SAT Plan.

The DT&E SAT Plan is prepared by the contractor and will identify the testing to be conducted at the first article site location. This plan will include the Delta DT&E test requirements which will incorporate tests that were unable to be accomplished at the contractor's facility.

4.4.2.5 Production Acceptance Test & Evaluation (PAT&E) FAT Plan.

The PAT&E FAT Plan is prepared by the contractor and details the test methodology on each production unit to be conducted at the contractor's facility. This will ensure that the production units meet the same requirements of the first article systems from previous test phases.

4.4.2.6 PAT&E SAT Plan.

The PAT&E SAT Plan is prepared by the contractor and describes the testing for each production unit to be conducted at the

system delivery sites. This will ensure that the production units meet the same requirements as those sent to the first operational sites.

4.4.2.7 Reliability Test Plan.

The Reliability Test Plan is prepared by the contractor in accordance with MIL-STD-785. This plan assures that the reliability values and requirements of FAA-E-ITWS and the SOW are appropriately tested.

4.4.2.8 Maintainability Test Plan.

The Maintainability Test Plan is prepared by the contractor in accordance with MIL-STD-470B. This plan assures that the requirements of FAA-E-ITWS and the Statement of Work (SOW) are appropriately tested.

4.5 TEST PROGRAM RESOURCES.

4.5.1 Manpower and Training.

The ITWS test team includes AT, AF, AND-460, ACT-320, ACT-330, AOS-250 and support contractor personnel. The personnel will receive training in the areas of multitasking operating systems and communication protocols and networks, as applicable. This training will be provided by each organization. Training for the ITWS specific operations will include software, hardware, system operator, configuration management, and test tool training. This training will be funded by the program office, conducted by the contractor on the contractor procured software and will be further delineated in the SOW. Training for the test team will be completed prior to the commencement of OT&E.

Additionally, on the job training for the OT&E test team will be acquired through discussions with the ITWS contractor throughout the development and DT&E process, reading, and studying various system information contained in manuals and other system documentation. Experience will also be gained through hands-on system operation during pre-OT&E activities. The projected ITWS test and evaluation personnel requirements are outlined in table 4.5.1-1.

TABLE 4.5.1-1. ITWS T&E PERSONNEL REQUIREMENTS

ITWS T&E Personnel Requirements							
FY	96	97	98	99	00	01	
Test Phase	DT&E	DT&E/ OT&E	DT&E/ OT&E	DT&E/ OT&E	OT&E/ PAT&E	PAT&E	
Organizations*							Total MY/Org
ACT *	7.00	8.00	11.00	9.00	7.00	5.00	47.00
AOS	2.00	4.00	5.00	5.00	5.00	5.00	26.00
AT	1.00	1.00	2.50	1.50	1.50	1.00	8.50
AF	0.00	0.50	2.00	3.00	3.00	3.00	11.50
AND	2.00	3.00	4.00	4.00	3.00	2.00	18.00
Prime Contr actor	0.00	3.00	5.00	5.00	2.00	2.00	17.00
Total MY/FY & Test Phase	12.00	19.50	29.50	27.50	21.50	18.00	128.00
* Manpower requirements include both FAA and contract support							

4.5.2 Test Articles.

The first delivery test articles will consist of four complete IOC ITWS system suites. The first site will be the FAA Technical Center, Atlantic City International Airport, NJ. The second and third sites will be located at the simple and complex sites which are presently TBD. The fourth unit will be delivered to the Program Support Facility (PSF) in Oklahoma City, OK. The PSF unit will be used for maintenance training.

4.5.3 Test Sites.

The selected simple and complex site will offer a broad spectrum of convective activity including both air mass differentials and frontal systems. The simple site will assess the minimum interface functionality, while the complex site will assess the interfaces with multiple airports and radar systems within an operational environment. Both sites will assess the interface functionality, operational effectiveness, and suitability, including AF functions, within an air traffic environment. Testing will be conducted at the first three facilities listed in section 4.5.2.

4.5.4 Test Support Equipment.

The following is a list of anticipated test equipment required for the ITWS OT&E test program. Additional test equipment may be required as the T&E program progresses.

a. A contractor-developed test tool will be required to play back weather data recorded from ITWS input sensors. This tool will be a development contractor deliverable and will be used at the FAA Technical Center to develop and execute weather scenarios that test the ITWS interfaces and system performance.

b. Protocol analyzers will be used throughout the ITWS testing cycle for validation, interpretation, and troubleshooting of the system's communications.

c. MIT/LL facilities will assist in offline Data Reduction and Analysis (DR&A) of recorded sensor data sets.

d. A test suite at the FAA Technical Center will be required to support meteorological data analysis of the ITWS products and to display raw input data and intermediate products for comparison to ITWS products. The test suite will consist of several workstations displaying raw

sensor input and intermediate products. Application software to support the test suite will be provided by MIT/LL.

e. Communication lines and modems to support integration testing at the Technical Center. Seven dedicated communication lines and modems are anticipated for the interface testing. The lines will require a minimum of a 9600 $KBPs^{-1}$ and T-1 rates.

f. AOS support equipment will be provided when available.

4.6 TEST CONFIGURATION MANAGEMENT.

The contractor will follow configuration management guidelines in accordance with the FAA-STD-021, FAA-STD-026, and FAA Order 1800.8F for software development. The configuration management program will establish a Software Configuration Control Board (SCCB). The SCCB establishes a baseline for software requirements, software design and developed software. Any changes to the baselined requirements or design are submitted to the SCCB for approval. Requirement and design changes are submitted via an Engineering Change Proposal (ECP).

As part of the configuration management program, an FCA and a PCA will be conducted. Configuration audits will be conducted by the Program Office or designated representatives.

The FCA is a formal examination of functional characteristic test data for a configuration item, prior to acceptance, to validate that the item has achieved the performance and functional characteristics specified in its functional or allocated configuration identification. The PCA is a formal examination of the "as-built" configuration of a unit to verify that it conforms to its technical design in order to establish the configuration item's initial product configuration identification.

During testing, the test team will be responsible for documenting the configuration during each phase of testing. Test procedures and data sheets will be used to document any configuration changes. Test data will be analyzed in accordance with any configuration changes.

4.7 TEST PLANNING WORK GROUP.

The TPWG consists of representatives from ACT-320, ASD-140, ATQ-3, ATR-330, ASD-120, AOS-250, and AND-460. The TPWG will meet routinely to discuss test related issues including the TEMP and

test plan and procedure development, DEMVALs, OT&E schedules, etc. The organizational representatives will provide input for test requirements and represent their respective organizations regarding acceptance of test responsibilities. MIT/LL and the development contractor are ad hoc members and will be included as required.

4.8 METEOROLOGICAL EVALUATION PANEL.

A panel of independent experts from various scientific and technical organizations (ACT-320, AOS-250, NSSL) will perform an assessment of ITWS product performance. The panel will be ongoing and will provide input to test personnel and assist in resolving DT&E and OT&E issues.

5. T&E PROGRAM DESCRIPTION.

5.1 COMPLETED DT&E/PAT&E.

There has been no DT&E/PAT&E performed on the ITWS. The DT&E test phase will begin at completion of the TRR.

5.2 COMPLETED OT&E.

All completed OT&E was conducted during the demonstration phase. An informal DEMVAL was conducted at Orlando and Dallas in 1993. This DEMVAL was an initial verification of the ITWS' capability to meet AT weather requirements and produce scientifically valid products. An independent science panel was convened in 1993 to review the science of the ITWS algorithms. Based on the results of the 1993 DEMVAL and Science Panel findings, the program office decided to proceed with a formal DEMVAL in 1994. The Demonstration Phase OT&E (DEMVAL) was conducted at Orlando and Memphis during the summer of 1994. The test reports are listed below.

DOT/FAA/CT-TN95/1	ITWS Operational Test and Evaluation (OT&E) Demonstration/Validation at Orlando, FL and Dallas Fort-Worth, TX (May-September 1993), DOT/FAA/CT-TN95/1.
ACT-320 Report	ITWS Demonstration/Validation Phase OT&E Final Report, (Draft), February 1995.

The following are the ITWS COIs and status from the 1994 DEMVAL.

a. Are the ITWS products useful during operationally significant weather in terms of their availability, timeliness, and suitability for AT use? Are detections and false alarm rates acceptable to users?

Status: Partially resolved during the demonstration phase; further product suitability, detection and false alarm evaluations required.

b. Are the ITWS products displayed without the need for further meteorological interpretation? Is the displayed information understandable?

Status: Partially resolved for the demonstration phase; further ongoing verification will be conducted during the development phase.

c. Does the ITWS reduce (perceived) controller workload during adverse weather conditions in the terminal area?

Status: Partially resolved for the demonstration phase; further ongoing verification will be conducted during the development phase.

d. Do ITWS products enhance the effectiveness of traffic planning/management during adverse weather conditions in the terminal area? Are terminal airspace and runways planned for and used more effectively?

Status: Partially resolved for the demonstration phase; further ongoing verification will be conducted during the demonstration phase.

e. Does the unavailability of interfacing systems/sensors adversely affect ITWS operations?

Status: Partially resolved during the demonstration phase; the unavailability of certain input sensors (e.g., TDWR, LLWAS) during the DEMVAL did not preclude the ITWS from producing useful products to AT personnel. Since during DEMVALs, the interface products were distributed by MIT/LL (not IRD requirements). These results do not carry over for the development system. However, the DEMVAL results do provide a framework for further assessing this COI. Therefore, during OT&E the system reaction to sensor loss and subsequent reacquisition of sensor input will be evaluated along with the user response to sensor loss.

f. Will input sensor quality be adequate?

Status: Partially resolved for the demonstration phase. ITWS produced accurate products for the available input sensors during the 1994 DEMVAL.

5.3 DEMONSTRATION TEST & EVALUATION (DT&E) TESTING.

5.3.1 DT&E Program Description.

DT&E is conducted to assist in the engineering and development process by determining the degree to which functional engineering specifications are addressed. DT&E includes test and evaluation of subsystem hardware and software on full-scale engineering models.

DT&E will be conducted in accordance with FAA-STD-1810.4B and the FAA approved CMTP. ACT-320 will be responsible for monitoring all aspects of the ITWS DT&E testing cycle.

DT&E will verify that the specification requirements of FAA-E-ITWS are met and that the developed interfaces are correctly implemented according to applicable IRDs. Elements of the ITWS DT&E phase are depicted in figure 5.3.1-1. DT&E for the ITWS will consist of DT&E DQT, DT&E FQT, DT&E FAT, and DT&E SAT. These DT&E phases are discussed in the following sections.

5.3.1.1 DT&E Design Qualification Tests (DT&E DQT).

DT&E DQT tests will be conducted, comprising of informal software unit testing and software/hardware integration testing on components and subsystems during the development process. As part of DQT, software tests will determine the accuracy of the software developed to implement the government-furnished meteorological and display algorithms.

5.3.1.2 DT&E Functional Qualification Tests (DT&E FQT).

DT&E FQT tests will be performed on the computer software configuration item, computer software component and computer software unit requirements identified in the software requirements specification and associated interface documents. As part of FQT, software tests will determine the accuracy of the software developed to implement the government-furnished meteorological and display algorithms functions on the ITWS platform in accordance with system requirements. The tests will verify that the developed software is consistent with the

algorithms and the software requirements specification requirements.

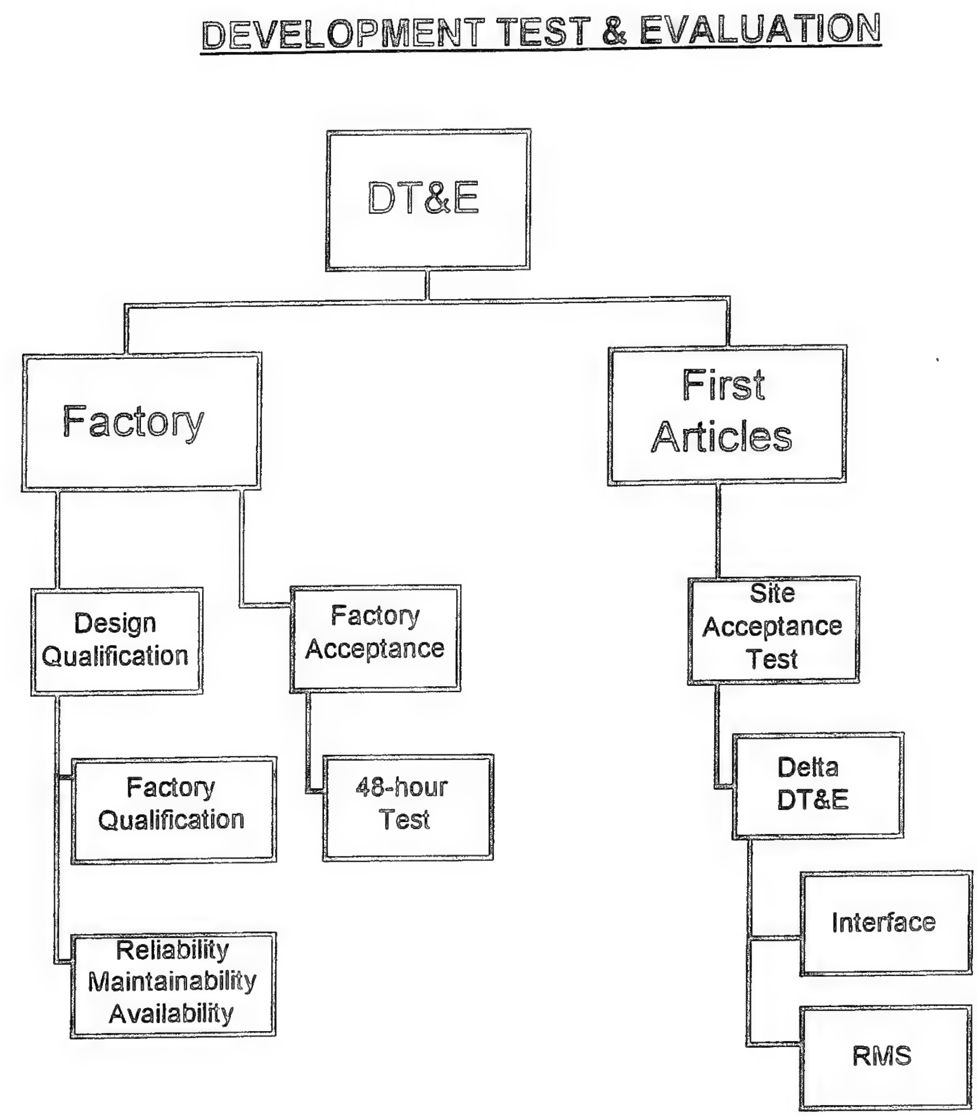

FIGURE 5.3.1-1. DT&E ELEMENTS

5.3.1.3 DT&E Reliability, Maintainability, and Availability.

5.3.1.3.1 DT&E Reliability.

The ITWS contractor will conduct a reliability program in accordance with FAA-E-ITWS and the ITWS SOW. The test procedures will conform to the technical requirements of MIL-STD-785B, Tasks 101-104, 201-204, and 303. Each system will meet a minimum Mean Time Between Failures (MTBF) of 2704 hours. MTBF data will be collected throughout DT&E and OT&E testing. Reliability will be demonstrated during DT&E and as required during OT&E Integration, OT&E Operational, OT&E Shakedown, PAT&E, and Field Shakedown testing. ACT-320 and AOS-250 will verify the ITWS meets this reliability requirement. Contractor testing during DT&E FAT will include an operability test to ensure the ITWS can operate without failure for an extended period of time.

5.3.1.3.2 DT&E Maintainability.

The ITWS contractor will conduct a maintainability program in accordance with FAA-E-ITWS and the ITWS SOW. The program will be carried out according to the requirements of MIL-STD-470B, Tasks 101-104, 201-203, 205, 207, 301 and 302. The Mean Time To Repair (MTTR) will not exceed 0.5 hour. A maximum time allowed for a single repair will be in accordance with the requirements of FAA-E-ITWS and the SOW. Maintainability will be demonstrated during DT&E and as required during OT&E Integration, OT&E Operational, OT&E Shakedown, PAT&E, and Field Shakedown testing. ACT-320 and AOS-250 will verify this maintainability requirement.

5.3.1.3.3 DT&E Availability.

The ITWS will be tested to verify that the system meets the availability requirements from the FAA-E-ITWS and SOW. The availability of the system interfaces will also be examined to determine the availability of the sensor inputs. The contractor will demonstrate and verify operational availability of .9998. For the purposes of operational availability calculations, the MTTR is taken as the total time of all interruptions of service regardless of the cause or duration of each. Service interruptions do not include natural disasters. Availability will be demonstrated during DT&E and as required during OT&E Integration, OT&E Operational, OT&E Shakedown, PAT&E, and Field Shakedown testing. ACT-320 and AOS-250 will verify this availability requirement.

5.3.1.4 DT&E Factory Acceptance Testing (FAT).

As part of the DT&E effort, the contractor will plan and conduct a DT&E FAT of the ITWS, which will be formally witnessed by the FAA. The DT&E FAT will verify the capability of ITWS to meet all functional, interface, and performance requirements of the ITWS Specification FAA-E-ITWS. DT&E FAT is conducted at the contractor's facility and will be conducted by the contractor using FAA-approved contractor test plans and procedures. The contractor is responsible for the timely and satisfactory completion of testing in accordance with the ITWS schedule.

A 72-hour system operability test will be conducted as part of FAT. The test will utilize a representative sample of test cases, including:

a. archiving and playback of scenarios;
b. switching SDs to TDWR and LLWAS, then back to SD mode; and
c. switching the system from product generation mode to maintenance mode for a period of no less than 4 hours and then switching back to the product generation mode.

5.3.1.5 DT&E Site Acceptance Testing (SAT).

DT&E SAT is performed by the system developer on the first article(s) system delivered to each of the test sites before acceptance of the subsystem by the FAA CAI. The purpose of this testing is to ensure that the systems are properly installed, ready for operation, and include all necessary equipment. This testing is monitored by government personnel.

As part of DT&E SAT, Delta DT&E will be conducted by the contractor at the FAA Technical Center. This will test the interfaces which were not available at the contractor's facility and exist within the FAA Technical Center. Additionally, RMS functionality will also be tested. DT&E SAT will be conducted in accordance with the FAA-approved contractor DT&E SAT test plan.

5.3.2 Development Contractor Test Documentation.

The development contractor will prepare a CMTP in accordance with the Data Item Description (DID) and Contract Data Requirements List (CDRL) specified in the SOW. This CMTP provides information that pertains to the contractor conducted testing in DT&E and PAT&E. This document will show traceability to the ITWS specification and VRTM. Additionally, the contractor will develop and have FAA approval of the DT&E plan. These

plans/procedures will have pass/fail criteria for each of the requirements tested.

The CMTP will be developed from the DT&E and PAT&E test requirements stated in the Quality Assurance section of the FAA-E-ITWS and the SOW. The CMTP will be updated as required throughout the contract to reflect any ECPs and/or contract modifications that alter the testing program. DT&E test plans will be prepared in accordance with the DIDs and CDRLs specified in the SOW.

5.3.3 Government Responsibilities.

The government will prepare the ITWS Specification (FAA-E-ITWS), SOW and TEMP documents. The TEMP will contain the VRTM and the VRTM will contain the ITWS requirements specified in NAS-SS-1000, Volumes I-V. Presently, the ITWS specification is not baselined. When baselined, the VRTM will be updated to map the specification requirements to the NAS requirements. The revised VRTM will be submitted for TPRC approval.

This VRTM will be used to ensure that the prime contractor tests the same set of requirements upon which the system was designed. The government will identify CPPs, COIs and Exit Criteria (see sections 3.4.1, 3.5, and 3.4.2) that will be used to transition the ITWS from DT&E to OT&E and OT&E to KDP-4. OCD will not be performed on the ITWS. CPPs, COIs, and exit criteria are being added to the 'Notes/Remarks' column of the VRTM where appropriate.

5.4 PRODUCTION ACCEPTANCE TEST & EVALUATION TESTING (PAT&E).

The contractor will conduct PAT&E on each production unit to verify that the product conforms with all provisions of the contract and meets the stated requirements. The tests will be conducted in accordance with the FAA-approved PAT&E test plans and procedures. The Technical On-site Representative (TOR) will also be involved with this test phase to assist in maintaining the facility data reference file and to ensure user readiness for system sell off. Operational elements of the PAT&E phase are depicted in figure 5.4-1. The contractor will conduct testing of the ITWS at each operational facility before acceptance and deployment of the subsystem by the FAA CAI.

5.4.1 PAT&E Factory Acceptance Testing (PAT&E FAT).

During PAT&E, FAT is conducted by the contractor at their factory for each delivered item to verify that it conforms to applicable specifications and requirements. A limited subset of DT&E FAT

requirements will be performed on each PAT&E article. Successful completion of PAT&E FAT represents a partial FAA acceptance of the production article.

5.4.2 PAT&E Site Acceptance Testing (PAT&E SAT).

PAT&E SAT testing is conducted to verify the effective installation of the ITWS into each facility and to verify the suitability of the system for Field Shakedown testing and AT operations. The TOR will also be involved with this test phase to assist in maintaining the facility data reference file and to insure user readiness for system sell off.

PRODUCTION ACCEPTANCE TEST & EVALUATION

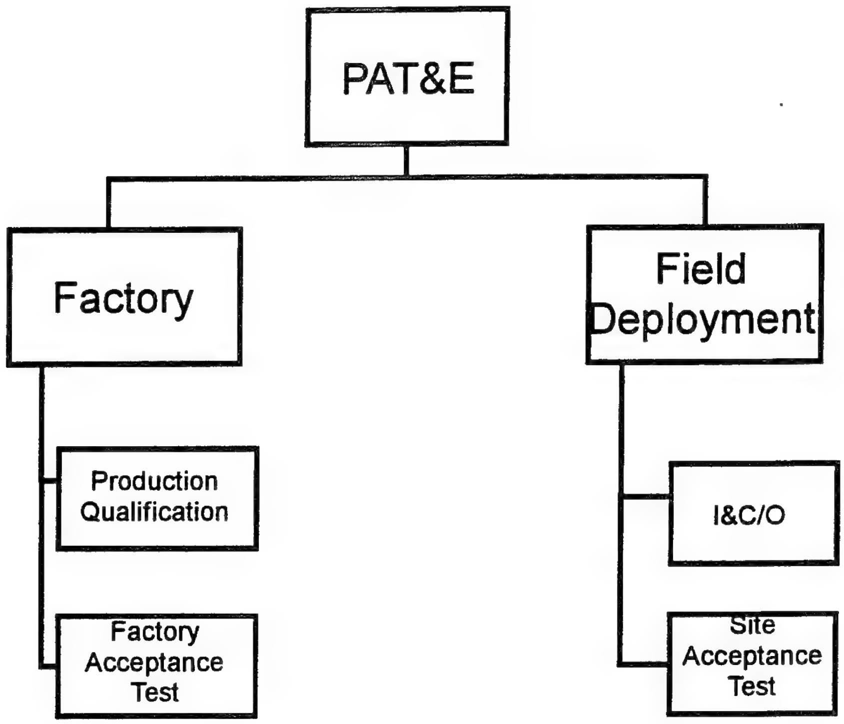

FIGURE 5.4-1. PAT&E ELEMENTS

5.5 OT&E TESTING.

The OT&E testing will be performed in the following three phases:

- Phase 1: Interface/Integration Facility; (FAA Technical Center, Atlantic City International Airport, NJ);
- Phase 2: Operational Site; simple site (TBD);
- Phase 3: Operational Site; complex site (TBD).

This phased approach ensures a structured methodology for examining and resolving COIs and OT&E requirements (see subsections 5.5.1.1.1 - 5.5.1.1.3 and 5.5.2 - 5.5.2.2). Additionally, it provides a framework that requires verification that the system has met the exit criteria and can proceed into the next phase. Elements of OT&E are depicted in figure 5.5-1.

OT&E Shakedown will be conducted independently of OT&E Operational and Integration testing. Requirements tested during the OT&E Operational and Integration testing and determined acceptable, will not be retested during OT&E Shakedown. These requirements will be addressed in the OT&E Shakedown test plan.

The OT&E Integration test environment will include the FAA Technical Center for initial interface integration testing, followed by testing in AT operational environments. ACT-320 will develop the OT&E Test Plans and Procedures in accordance with FAA Order 1810.4B and FAA-STD-024b. These Plans and Procedures will present each requirement with pass/fail criteria.

AT and AF personnel will be actively involved in the hands-on evaluation of the ITWS equipment. The OT&E will be conducted primarily in an operational environment to evaluate the effectiveness and suitability of the ITWS into the NAS.

The planned approach for resolution of COIs during OT&E is presented in section 3.5. Test limitations that may impact the resolution of the COIs and impede the ITWS OT&E testing are ITWS dependencies on other systems for input data and the absence of hazardous weather phenomena. The CPPs found in section 3.4.1 will be tested in accordance with the VRTM found in section 7 of this document.

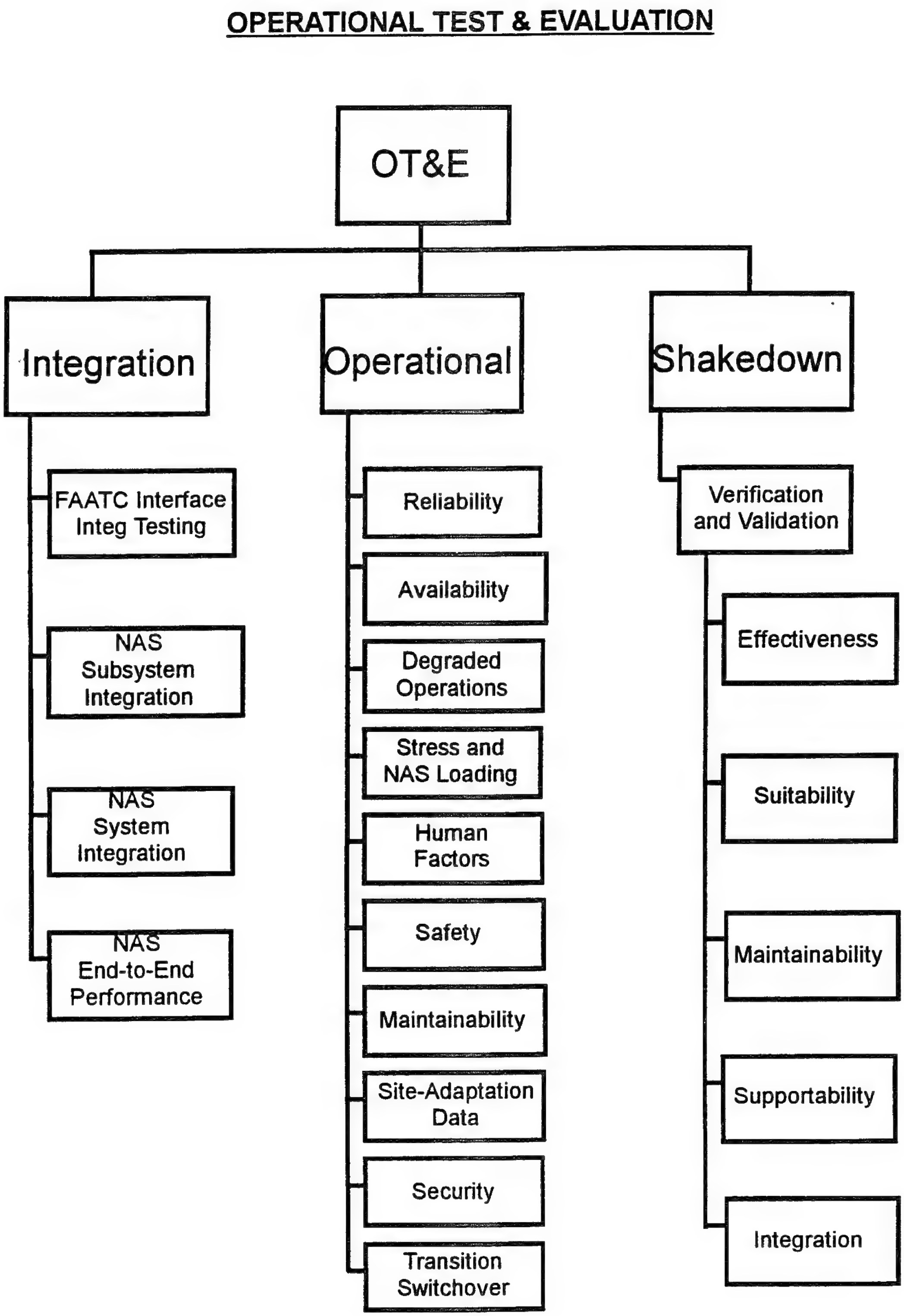

FIGURE 5.5-1. OT&E ELEMENTS

5.5.1 OT&E Integration Testing.

OT&E Integration consists of testing the NAS system end-to-end performance. The ITWS VRTM lists the requirements from the NAS-SS-1000, Volumes I-V, that will be tested throughout the test phases.

5.5.1.1 OT&E Integration Test Program.

This testing will ensure the successful integration of NAS systems, subsystems, and end-to-end performance requirements. The subsystems will be tested in a NAS system equivalent environment. If an interface is not available, then a simulation will be utilized. The ultimate goal of integration testing is to ensure that the new system's end-to-end performance does not adversely impact operational NAS systems or subsystems and that system performance achieves the goals.

The OT&E Integration will employ a structured methodology to verify the interoperability of the ITWS into the NAS. A building block approach that first verifies the communications layers in accordance with approved communication models will be used. Once testing is completed, applications processes for data transferred will be conducted. This testing will initially be conducted on each individual interface, followed by testing on multiple interfaces.

5.5.1.1.1 Phase 1 - OT&E Integration Testing.

The purpose of the interface/integration facility testing is to mitigate interface problems before they are encountered in an operational environment. This testing will utilize the interfaces available within the FAA Technical Center. Limited operational testing will also be conducted at this facility by using real-time data acquired from operational sensors located at the Atlantic City International (ACY) and Philadelphia International (PHL) airport facilities. The impact of sensor input loss to the ITWS and to ATC personnel will be initially assessed. RMS integration testing will also be addressed during this phase. Refer to the Phase I configuration diagram, figure 5.5.1.1.1-1.

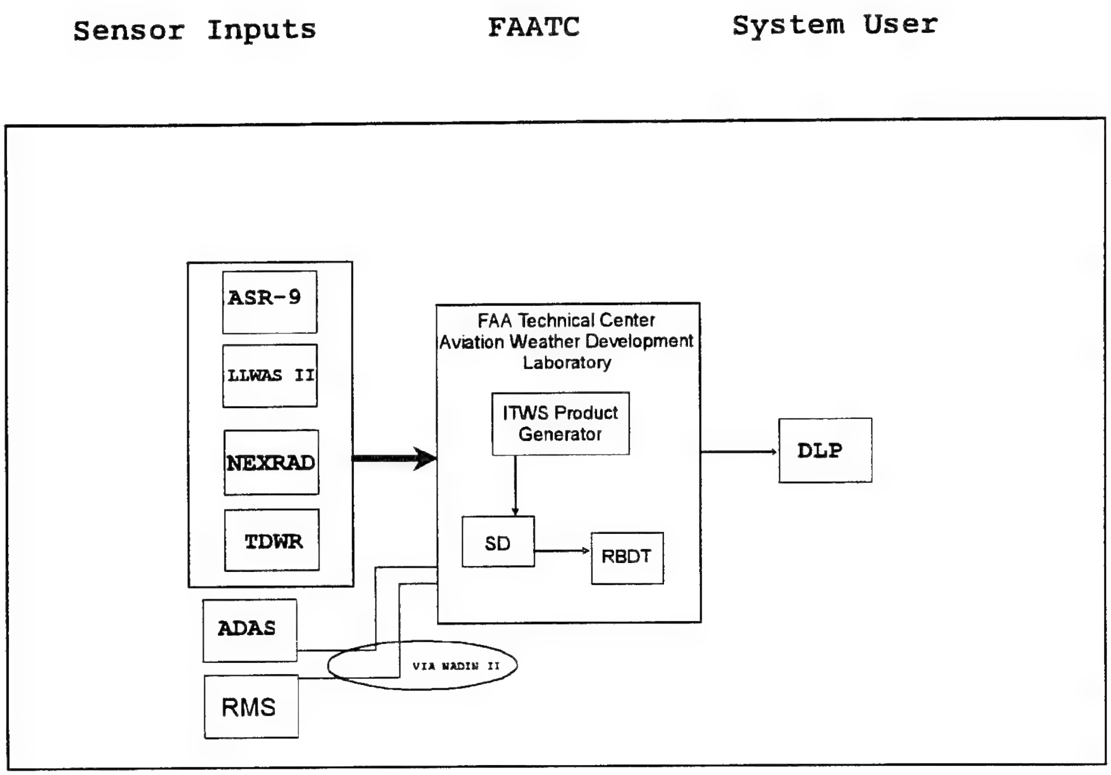

FIGURE 5.5.1.1.1-1. FAA TECHNICAL CENTER OT&E INTEGRATION PHASE I CONFIGURATION

5.5.1.1.2 Phase 2 - OT&E Integration Testing.

The OT&E Integration testing will be conducted in an AT operational facility. Simple site testing, currently TBD, will assess interface functionality within an AT environment. This will verify the ITWS capability of interfacing with all designed system inputs. This configuration will include a single input from each of the ITWS interfaces. Refer to the Phase II configuration diagram, figure 5.5.1.1.2-1. OT&E operational testing will also be conducted at this facility.

Sensor Inputs System Users

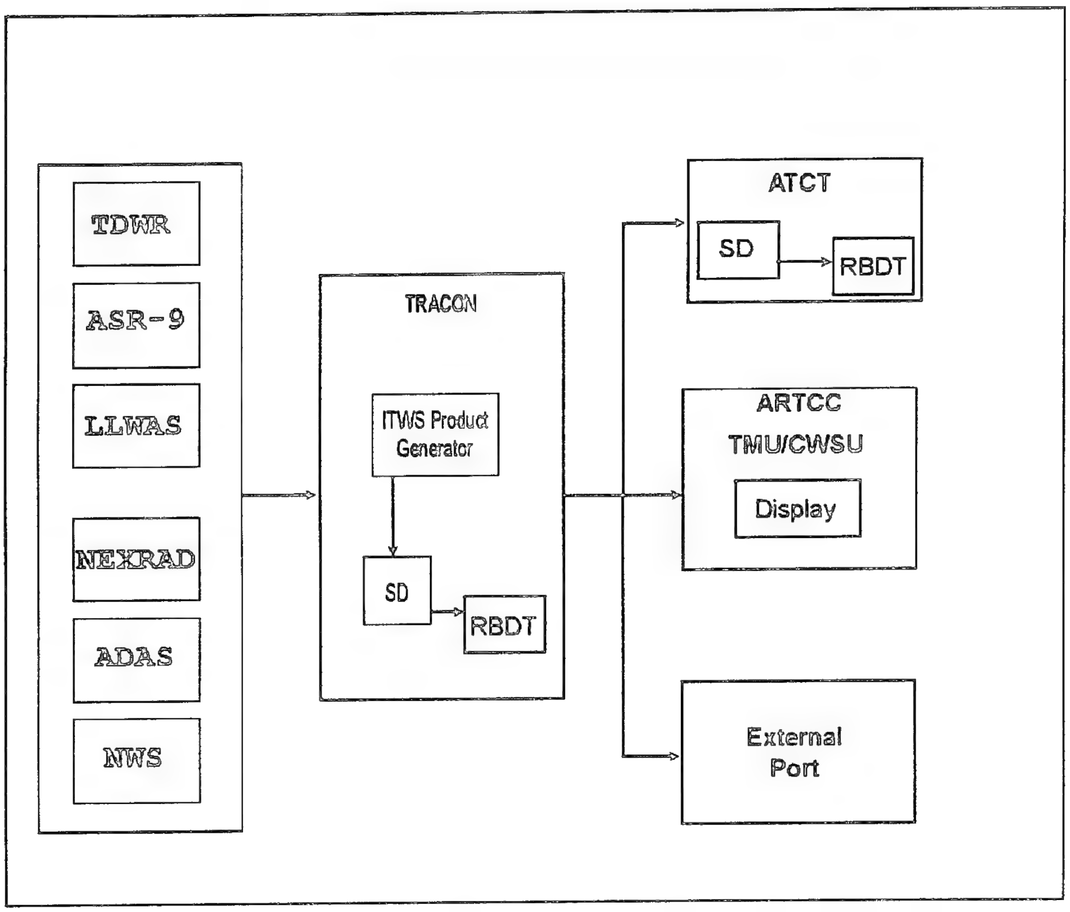

FIGURE 5.5.1.1.2-1. SIMPLE SITE OT&E INTEGRATION PHASE II CONFIGURATION

5.5.1.1.3 Phase 3 - OT&E Integration Testing.

The complex site, currently TBD, will be conducted in an AT operational facility. It is analogous to the simple site testing with the exception that the complex site will ingest inputs from multiple radars and airports. Refer to the Phase III configuration diagram, figure 5.5.1.1.3-1. OT&E operational testing will also be conducted at this facility.

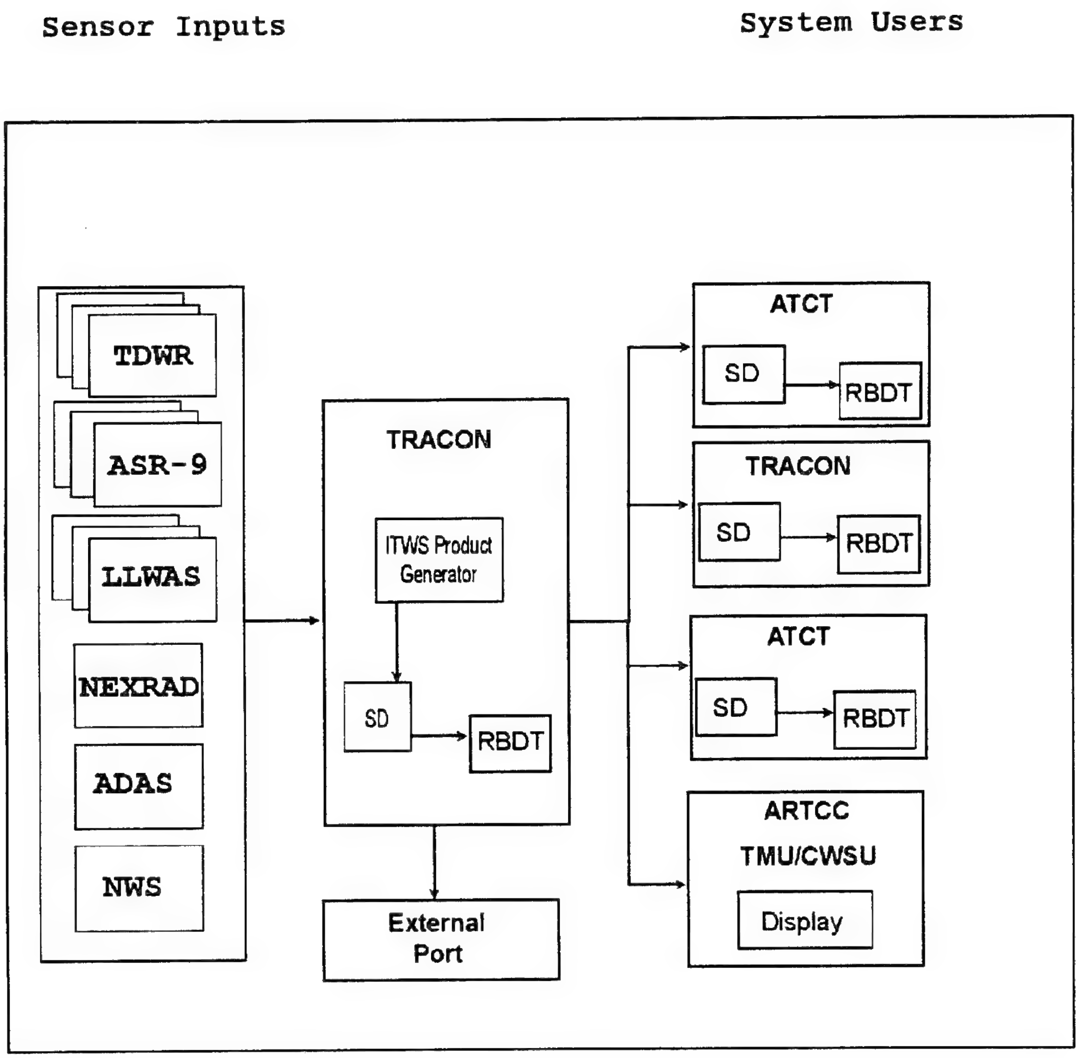

FIGURE 5.5.1.1.3-1. COMPLEX SITE OT&E INTEGRATION PHASE III CONFIGURATION

5.5.1.2 Schedule.

Refer to the Integrated Schedule in appendix B.

5.5.1.3 Key Sites: Anticipated OT&E integration test sites.

a. FAA Technical Center, Atlantic City International Airport, NJ;
b. simple site, TBD;
c. complex site, TBD.

5.5.1.4 Training.

AF personnel participating in DT&E/OT&E will require training on the operations (hardware and software) of the ITWS prior to utilizing the products and participating in testing. AF personnel involved in testing will have a level of competence with respect to training (e.g., training on C, C++, UNIX, etc.). Training (e.g., hardware operation or software) will be developed by the contractor on the contractor developed software in accordance with the terms of the SOW. The AT personnel will also require training on the ITWS in preparation for the 1995 and 1996 testing. Additional training requirements are defined in section 4.5.1 of this document.

5.5.1.5 Personnel.

The following personnel will be required to prepare for and conduct testing:

a. ACT-320 will provide test engineers, meteorologists, support, and Human Factors personnel to develop plans, procedures and reports, and to conduct OT&E testing. Personnel requirements and estimated costs are presented in paragraph 4.3. Additionally, ACT-320 will require planning support to assist the Program Office in maintaining a workable schedule and will track action items and record proceedings of the Test Schedule Status Reviews (TSSR).

b. ACT-330 will provide test engineers to draft plans, procedures, conduct testing, and draft reports for RMS testing. Budgeting, staffing, and training test personnel will be the responsibility of ACT-330.

c. AOS-250 personnel requirements are defined in section 5.5.3.3.

d. AT personnel will provide trained operators to participate in the operational test environment to evaluate the effectiveness and suitability of the ITWS.

e. AF regional technicians will be required for system and maintenance support. A Memorandum of Agreement (MOA) will be prepared and coordinated.

f. Prime contractor support for OT&E is defined within the SOW and will occur prior to software development completion. The following list prime contractor OT&E support:

   1. The contractor support for OT&E, will at a minimum, ensure the communication software provides connectivity to live interfaces.

   2. The contractor must, for a minimum 6-month period, provide the following services to support the government conduct of OT&E testing: systems engineering, hardware engineering, software training, communication hardware and software, and hardware maintenance personnel at the FAA technical center, "simple" site and "complex" sites.

   3. The contractor will provide the factory software development facility and support services.

<u>5.5.2 OT&E Operational Testing</u>.

The following sections describe the OT&E Operational Test Program that will verify the operational effectiveness and suitability of ITWS to fulfill its NAS mission from both an AT and AF perspective. Key sites, personnel training, and test methodologies are similar to those described in the OT&E Integration activities described in section 5.5.1. Operational elements of OT&E are depicted in figure 5.5-1. Each of the elements comprising the OT&E Integration testing is defined in subsections a through j.

<u>a. Reliability</u>.

FAA Technical Center personnel will collect failure data which will be scored as a Relevant Failure or a Nonrelevant Failure (not inherent to the equipment). ACT-320 will review reliability data provided during DT&E to perform a reliability trend analysis. At that time, ACT-320 will recommend to the program office if additional reliability testing is required during OT&E.

The trend analysis will be used by ACT-320 to predict system reliability to the configuration item level. Failure rate analysis will be based on actual operational experience, test data, experience with similar systems, and manufacturer specifications.

b. Availability.

Failure data and maintainability test results will be used in computing the ITWS system availability throughout all testing cycles. This analysis will be presented in the final DT&E Report.

c. Degraded Operations.

Degraded operations will be addressed by making the system operational with maximum data/sensor inputs. The maximum will be determined from the ITWS Radar/LLWAS Usage List. Each sensor will be disabled to determine the algorithm capabilities to produce a result and for the system to adjust to the abnormal operation from a data/sensor input failure. The transition to the TDWR and LLWAS modes will be observed. The transition to the ITWS mode will be observed as the data/sensor input is returned to available. Additionally, the NAS will be monitored to ensure that the degraded operations do not adversely impact other NAS systems (e.g., NADIN II, ADAS, etc.).

d. Stress and NAS Loading.

The system will be tested for stress and loading by implementing maximum data/sensor inputs beyond the complex site requirements. The maximum data/sensor input will be determined from the ITWS radar/LLWAS Usage List. The systems response to the maximum data/sensor input will demonstrate the systems capabilities and verify the performance. The simulation will be accomplished through the use of the test data injector and live interfaces.

e. Human Factors.

Human Factors personnel will assess end users performance in conducting tasks and human engineering issues associated with the system. Human factors personnel will evaluate the operations of the ITWS in order to determine if there are any adverse effects on air traffic controller efficiency, productivity, and safety. Additionally, the effect of the ITWS on AT planning/management and perceived controller workload

will be assessed. These evaluations will take place at each operational test site using live and/or canned data.

f. Safety.

The ITWS safety program will be in accordance with MIL-STD-882C and tasks 101, 102, 104, 106, 202, 204, 205, 302, and 303 in the ITWS SOW. Testing will include physical safety (electrical shock) and safety from a Human Factors viewpoint (i.e., obstruction, ease of repair, etc.).

g. Maintainability.

The ITWS will be tested by ACT-320 to predict system maintainability to the configuration item level. System fault(s) will be generated during the OT&E Operational test cycle to verify contractor maintenance requirements. These requirements include the ability of maintainers to diagnose and isolate faults, repair or replace modules, and perform operational checkout of the repaired item in accordance with the ITWS maintenance concept and procedures.

Certification of the procedures to determine the ITWS readiness to be put back into operation after repair will be demonstrated by the contractor and reviewed by the FAA. Maintenance documentation, including technical manuals and maintenance log entries will be reviewed/observed for clarity and detail. The latest baselined software version will be reinstalled on the system after an introduced system fault is corrected.

h. Site-Adaptation Data.

OT&E will verify that the ITWS is adaptable to function successfully in various site configurations. System performance should not be adversely impacted by the altering of system parameters to meet various site configurations. This adaptable parameters will be verified throughout OT&E testing at the sites.

i. Security.

The ITWS security program will be incorporated into the site implementation plan. Testing will include physical security requirements where applicable and operator security level (i.e., system administration, supervisor privileges, etc.). The ITWS will have the added physical security of the environment in which it resides.

j. Transition Switchover.

The ITWS will be evaluated to determine the effects its removal has on degradation of the NAS environment. This includes the availability and operability of backup systems for the ITWS when the system is not operational. The NAS environment will be monitored for adverse impacts of system loss.

5.5.2.1 Operational Test Site Locations.

ITWS OT&E test sites will be selected in different regions of the United States to offer a range of weather phenomena. This will ensure that the ITWS is evaluated in various weather data processing capacities. Additionally, the sites selected consist of both simple and multiple sensor configurations. These configurations are delineated by area of coverage for single or multiple airports with co-located ARTCCs. The simple site configuration will provide single radar sensor inputs while a complex site configuration will have multiple radar inputs. Refer to section 5.5.1.1 for site configurations.

There will be Four First Article Systems. Of these, OT&E Integration testing will be conducted on three units, which include a unit at the FAA Technical Center for interface and Integration testing, and an operational simple and complex test site (locations to be determined (TBD)). A simple site is defined as a single airport TRACON with single TDWR, Airport Surveillance Radar Model 9 (ASR-9), and Next Generation Weather Radar (NEXRAD) inputs. A complex site is defined as a multi-airport TRACON with multiple TDWR, ASR-9, and possibly, NEXRAD inputs. The fourth unit will be delivered to the PSF in Oklahoma City for maintenance procedural and shakedown test development.

5.5.2.2 OT&E Operational Risks That May Adversely Impact Test Completion.

a. The ITWS capabilities need to be tested with controlled input data in order to vary the loading conditions and minimize testing time. It is planned to have this data provided to ITWS via a test tool. This test tool will utilize weather data recorded from around the country over a prolonged period of time. Even with convective weather conditions, this weather data may be insufficient to provide the input data intensity required to test the ITWS past its critical performance thresholds.

b. Although the schedule allows time to collect weather data, due to the inability to control weather phenomena, sufficient

data may not be collected within the time allotted. Therefore, testing delays may be incurred.

c. Delays in the TDWR installation schedule may adversely impact the ITWS OT&E schedule.

5.5.2.3 Schedule.

See integrated schedule in appendix B.

5.5.3 OT&E Shakedown.

OT&E Shakedown testing will determine the overall readiness of the ITWS through the exercising of the system in an operational environment to support determination that the system is ready for full operation as part of the NAS. This will include testing to confirm that when the ITWS is operated and maintained by operational personnel in an operational environment, all requirements are met (see figure 5.5-1). Shakedown testing will verify the effectiveness, suitability, maintainability, supportability, and integration requirements of the system.

Effectiveness will assess the system's ability to provide reliable service for consistent product delivery under multiple operational conditions. Suitability will assess the system products and user/system transactions. Maintainability will assess the ease of maintaining the system throughout the operational/nonoperational states and to assess the system capabilities of displaying system statuses to the operator. Supportability will ensure that the system's hardware and software is capable of being maintained with the given documentation and training.

System integration testing will assess the ITWS operation and determine any negative impact on the existing air traffic control. Testing will include an assessment of the external inputs to the ITWS which include the systems as shown in figure 3.2-1.

5.5.3.1 OT&E Shakedown Organizations.

Shakedown testing will be conducted by AOS-250 at the simple and complex sites. The actual performance of the Shakedown tests will be by AF personnel and regional maintenance technicians who will use the services provided by the ITWS and who will have the maintenance responsibility for the selected test sites.

5.5.3.2 OT&E Shakedown Preparation.

AOS-250 will develop the OT&E Shakedown Test Plan and Procedures in accordance with FAA Order 1810.4B and FAA-STD-024B.

5.5.3.3 OT&E Shakedown Personnel and Training.

The following personnel will be required to prepare for and conduct OT&E Shakedown testing.

a. AOS-250 hardware and software engineers will develop the ITWS Shakedown Test Plan and Procedures, prepare reports, and conduct testing.

b. Regional technicians will be required for system and maintenance support of the system. The AOS-250 Shakedown test director will coordinate this effort with the region.

c. AOS-250 meteorologists will provide analysis of the meteorological performance of the ITWS algorithms.

d. Evaluation of training and maintenance will be performed as part of OT&E Shakedown.

5.5.3.4 Training.

AT personnel participating in the Shakedown testing will require training on the ITWS prior to utilizing the products and participating in evaluations. Regional maintenance technicians, as well as AOS-250 engineers, participating in Shakedown testing will require system maintenance training on the ITWS prior to system delivery and Shakedown testing. Both areas of training will be developed and conducted by the contractor in accordance with the ITWS SOW.

5.5.3.5 OT&E Shakedown Test Implementation.

Shakedown testing will be conducted in two phases:

Phase 1: Simple Operational Site
Phase 2: Complex Operational Site

The simple site configuration will provide single radar sensor inputs (see figure 5.5.1.1.2-1) while a complex site configuration will have multiple radar inputs (see figure 5.5.1.1.3-1).

Shakedown testing at the simple site configuration will include all elements of validation and verification as shown in figure 5.5-1. Shakedown testing at the complex site configuration will be centered around validating and verifying system integration of the multiple radar inputs.

Delays in the TDWR and NEXRAD installation schedules may adversely impact the ITWS Shakedown test schedule.

6. VERIFICATION REQUIREMENTS TRACEABILITY MATRIX.

Presently, the ITWS specification is not baselined. When baselined, the VRTM will be updated to map the specification requirements to the NAS requirements. The revised VRTM will be submitted for TPRC approval. The current VRTM is presented in appendix A.

7. INDEPENDENT OPERATIONAL TEST AND EVALUATION.

Independent OT&E will be conducted on the ITWS by the ATS Test Team. Details will be provided at a later date.

8. ACRONYMS AND ABBREVIATIONS.

ACF	Area Control Facility
ADAS	ASOS/AWOS Data Acquisition System
AF	Airway Facilities
AGL	Above Ground Level
AIV	Aviation Impact Variable
ALDARS	Automated Lightning Detection and Reporting System
AP	Anomalous Propagation
APME	Associate Program Manager for Engineering
APMQ	Associate Program Manager for Quality
APMT	Associate Program Manager for Test
ASOS	Automated Surface Observing System
ASR	Airport Surveillance Radar
ATC	Air Traffic Control
ATCT	Air Traffic Control Tower
ATIS	Automated Terminal Information System
ATR	Air Traffic Plans & Requirements Service
AWOS	Automated Weather Observing System
AWP	Aviation Weather Products
CAB	Configuration Control Board
CAI	Contract Acceptance Inspection
CDR	Critical Design Review
CDRL	Contract Data Requirements List
CMTP	Contractor's Master Test Plan
CPP	Critical Performance Parameters
COI	Critical Operational Issues
COTS	Commercial-Off-The-Shelf
DCE	Data Communications Equipment
DEMVAL	Demonstration/Validation
DFW	Dallas-Fort Worth International Airport
DID	Data Item Description
DLP	Data Link Processor
DQT	Design Qualification Test
DRR	Deployment Readiness Review

DTE	Data Terminating Equipment
DT&E	Development Test and Evaluation
EXCOM	Executive Committee
FAA	Federal Aviation Administration
FAATC	Federal Aviation Administration Technical Center
FAATG	Federal Aviation Administration Telecommunications Gateway
FAT	Factory Acceptance Testing
FCA	Functional Configuration Audit
FSD	Full Scale Development
GFE	Government Furnished Equipment
GFI	Government Furnished Information
IC&A	Initial Checkout and Acceptance
ICD	Interface Control Documents
ICDDT	Interface Control Document Database Development Tool
IMCS	Interim Monitor Control Software
IOC	Initial Operational Capability
IOT&E	Independent Operational Testing and Evaluation
IRD	Interface Requirement Documents
ISO	International Standards Organization
IPT	Integrated Product Team
ITWS	Integrated Terminal Weather System
KDP	Key Decision Point
LLWAS	Low Level Wind Shear Alert System
MCF	Metroplex Control Facility
MCO	Orlando International Airport
MDCRS	Meteorological Data Collection and Reporting System
MEM	Memphis International Airport
MIT/LL	Massachusetts Institute of Technology Lincoln Laboratory
MAOPR	Minimum Acceptable Operational Requirements
MNS	Mission Need Statement
MOA	Memorandum of Agreement

MPS	Maintenance Processor Subsystem
MTBF	Mean Time Between Failure
MTTR	Mean Time To Repair
NAS	National Airspace System
NCP	NAS Change Proposal
NEXRAD	Next Generation Weather Radar
NSSL	National Severe Storms Laboratory
NWS	National Weather Service
NWSTG	National Weather Service Telecommunications Gateway
OCD	Operational Capability Demonstration
ORD	Operational Requirements Document
ORD	Operational Readiness Demonstration
OSI	Open System Interconnection
OT&E	Operational Test and Evaluation
PAT&E	Production Acceptance Test and Evaluation
PCA	Physical Configuration Audit
PD	Program Directive
PDR	Preliminary Design Review
PFA	Probability of False Alarm
PM	Program Manager
POD	Probability of Detection
PIP	Program Implementation Plan
PSF	Program Support Facility
PSN	Packet Switching Network
PUP	Principle User Processor
QRO	Quality Reliability Officer
RBDT	Ribbon Display Terminal
RPG	Radar Product Generator
RMA	Reliability, Maintainability and Availability
RMMS	Remote Maintenance Monitoring System
RMS	Remote Monitoring Subsystem
RUC	Rapid Update Cycle
SAT	Site Acceptance Testing

SAV	State of Atmosphere Variable
SD	Situation Display
SOW	Statement of Work
STD	Standard
STP	Software Test Plan
T&E	Test and Evaluation
TBD	To Be Determined
TCCC	Tower Control Computer Complex
TDWR	Terminal Doppler Weather Radar
TEMP	Test and Evaluation Master Plan
TOR	Technical On-site Representative
TPRC	Test Policy Review Committee
TPWG	Test Planning Work Group
TRACON	Terminal Radar Approach Control facility
TRR	Test Readiness Review
TSSR	Test Schedule Status Reviews
VRTM	Verification Requirements Traceability Matrix
WMO	World Meteorological Organization

APPENDIX A
VRTM

ITWS Master VRTM

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
1 E	Storm extrapolated position			T		D	SFC-23000 ft w/i 50 NM	
2 E	Storm extrapolated position accuracy			T		D	Within 1 NMI, 90% of storm events, for 20 min extrapolation	
3 E	Storm extrapolated position times			T		D		Position projected 10 minutes and 20 minutes in the future.
4 E	Storm Update rate			T		D	>/=1 update per minute.	
5 E	Storm motion (direction)			T		D	+/-20 degrees for storms moving at 10 knots or above, 90% of storm events.	
6 E	Storm motion (speed accuracy)			T		D	+/-5 knots for storms moving at 10 knots or above, 90% of storm events	
7 E	Microburst Prediction (lead time)			T		D		</=2 minutes +/-2 min, prior to onset of microburst for 80% of predicted events.

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
8 E	Microburst Prediction (lead time)			T		D		</=2 minutes +/-2 min, prior to onset of microburst for 80% of predicted events
9 E	Timeliness of hazardous weather phenomenon (tornado, hail, mesocyclone)			T		D		</=1 minute of receipt of new data.
10 E	Automatic Switchover on ITWS failure.			T		D		Switch to TDWR display within 30 seconds of ITWS failure.
11 E	Product Archiving			T		D		15 day storage with ability to download data to another medium
12 E	Storm cell Information(association)			T		D	>/= 90% correct cell association unless constrained by sensor input.	
13 E	ITWS storm motion			T		D	SFC-23000 ft w/i 50 NM	
14 E	Longe range reflectivity and storm motion			T		D	SFC-23000 ft, w/i 200 NMI of NEXRAD site	
15 E	Storm Cell information			T		D	SFC-23000 ft w/i 50 NM	

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
16 E	ITWS and ASR-9 Precip			T		D	SFC-23000 ft w/i 50 NM	
17 E	Countdown timer			T		D		Activated automatically when gust front impacts an area assigned to RDT
18 E	Tornado			T		D	Max range of 40 NMI of ARP	
19 E	Microburst and Windshear			T		D	W/i 5 NMI of ARP	
20 E	Terminal Weather text message			T		D	SFC-23000 ft w/i 20 NMI	
21 E	Coverage area			T		D	SFC-23000 ft w/i 50 NMI	
22 E	ITWS allocated availability			T		D	>/=.98	
23 E	End-to-End Availability			T		D	Essential Service >/=.999	

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
24 D	Subsystem monitoring function.							Lead-In
25 C	ITWS shall accept inputs from the following sources: NEXRAD, TDWR, LLWAS II/III, ASR-9, ADAS, LPATS and NMC.	T		T	X	D		
26 G	Terminal Wind Vertical Resolution(between levels)			T		D	+/- 50 millibars	
27 B	DATA COLLECTION							LEAD-IN
28 E	ITWS gust front and wind			T		D	SFC-23000 ft w/i 30 NM	
29 G	Storm cell information timeliness to local user			T		D	</= 1 minute of data receipt from NWS	
30 E	Terminal winds			T		D	SFC-23000 ft w/i 50 NMI	
31 E	ASR-9 AP Edit(Inadvertent edit)			T		D	</= maximum of 10 km2 or 10% of contiguous area with weather reflectivity >/= level 3.	

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
32 G	Terminal Wind Horizontal Resolution			T		D	+/- 5 NMI within 50 nm; <18000 feet	
33 G	AP Excellence level			T		D	Edit AP when ASR-9 level is >/=2 levels over actual reflectivity level	
34 G	ASR-9 AP edit timeliness			T		D	</=15 seconds of ASR-9 update	
35 G	Storm cell association			T		D	>/=90% correct cell association unless constrained by NWS input	
36 G	Storm extrapolated position times			T		D	Position projected 10 minutes and 20 minutes in advance, site adaptable	
37 G	Storm Update rate			T		D	>/=1 update per minute	
38 G	Storm motion direction			T		D	+/-20 degrees, 90% of storm events	
39 G	Storm motion speed accuracy			T		D	+/-5 knots, 90% of storm events	

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
40 G	Microburst prediction accuracy			T		D	</=2 minutes prior to onset of microburst for 90% of predicted events	
41 G	Microburst probability of false microburst alert			T		D	</=0.1	
42 G	Timeliness of weather reporting (tornado, hail, mesocyclone)			T		D	</=1 minute of receipt of NWS data	
43 G	End-to-end Availability			T		D	Essential Service>/=.999	
44 E	Terminal Wind (Vertical resolutionbetween levels)			T		D	50 millibars.	
45 G	Automatic ITWS failure recovery			T		D	Switch to TDWR display within 30 seconds of ITWS outage.	
46 G	ASR-9 AP inadvertent edit			T		D	</=10 km2 of area	
47 E	Terminal Wind (Horizontal Resolution)			T		D	5 NMI within 50 NMI; </=23,000 ft.	

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
48 E	ASR-9 AP editAP Excedence level			T		D	Display the edited region of each ASR-9 input weather with reflectivity level >/= level 1.	
49 E	Terminal Wind(Direction)			T		D	Within 20 degrees 80% of time when velocity >/= 10K.	
50 G	ITWS Allocated Availability			T		D	>/=.9998	
51 E	ASR-9 AP edit (timeliness)			T		D	</=15 seconds of ASR-9 update.	
52 G	ITWS Reliability			T		D	</=2704 MTBF	
53 G	Coverage (Stand-a-lone) Area			T		D	Surface - 18000 Above Ground Level (AGL), 50 nautical miles (NMI) radius from Airport Reference Point (ARP), product dependent;b. Surface - 23,000 feet AGL for "combined" TRACON;	
54 G	Retention			T		D	6 hours off-line storage	
55 G	Data Archive			T		D	15 days of off-line storage	

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
56 E	Terminal Wind(Velocity)			T		D	+/- 10 Knots 80% of time for wind speed >/= 10K.	
57 C	The ITWS shall be capable of a probability that a prediction is false shall be less than 0.10.	T		T	X	A		
58 C	The ITWS shall report wind loss estimates within +/- 5 knots or 20% of estimated loss, whichever is greater 95% of the time.	T		T	X	D		
59 C	The ITWS shall have the following update rates for its products:							LEAD-IN
60 C	The ITWS shall generate a text-based product including the following elements Previous microburst or wind shear impacts for at least 5 minutes after the end of the impact.	T		T	X	D		
61 C	The ITWS shall provide a precipitation map with the performance requirement that the ITWS shall not inadvertently edit out more than the greater of 10% or 10 km2 of the actual weather reflectivity regions greater than or equal to level 3.	T		T	X	I		
62 C	The ITWS shall generate a text-based product including the following elements:. Storm cells within 15 NMI of the airport, characterized by distance to the ARP, azimuthal extent and intensity	T		T	X	D		
63 B	EVERY 6 MINUTES			A	X	T		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
64 C	The ITWS shall generate a character graphics product including Weather within 15 NMI of the ARP including precipitation, mircobursts, and gust fronts.	T		T	X	D		
65 C	Terminal weather text message accuracy							Lead-In
66 C	A warning from the microburst prediction function shall be issued no more than 2 minutes before the onset of a microburst for at least 90% of the predicted events.	T		D	X	D		
67 B	TIMELINESS			A,T	T	X		LEAD-IN
68 C	The ITWS terminal weather text message shall report the expected precipitation element with a probability of a correct prediction being at least 75% with no more than 35% probability of a false alarm.	T		T	X	D		
69 B	DISPLACEMENT ERROR			A	T	X		LEAD-IN
70 B	The ITWS shall have the following update rates for its products: UPDATE RATES							LEAD-IN
71 B	EVERY 5 MINUTES			A	X	T		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
72 C	The ITWS shall provide weather products in accordance with the following paragraphs							Lead-In
73 B	LOCATION			A,T	T	X		LEAD-IN
74 D	For 3.1.1.1.1.9.2.5.2.5. of NAS SS-1000, the response time shall be measured under the peak hour transaction loading.	T		T	X	D		
75 C	The ITWS shall be capable of probability that an alarm is false less than 10%.	T		A	X	A		
76 C	Coverage area for weather products							LEAD-IN
77 C	The start time shall be accurate to within +/- 5 minutes with at least 50% probability within 5 minutes of the actual start time.	T		T	X	D		
78 C	The ITWS shall associate 95% of the phenomena to the correct storm cell with the probability of an association error greater than 5 NMI less than 5%.	T		T	X	D		
79 A	Analyze and evaluate the effectiveness of the traffic management system and notify specialists of results within 10 seconds of request.	X		T	X	D		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
80 C	The ITWS shall provide wind vector components accurate to +/- 10 knots, 80% of the time in regions and at times when the TDWR and NEXRAD provide velocity data that meets the Doppler weather radar accuracy specifications.	T		T	X	D		
81 C	The products may be centered around a specific airport's ARP.	D		D	X	D		
82 B	Multiple Itws Airports			D	D	D		LEAD-IN
83 B	TERMINAL WEATHER TEXT MESSAGE ACCURACY							LEAD-IN
84 B	INADVERTENT EDITING			A	T	X		LEAD-IN
85 B	EVERY MINUTE			A	X	T		
86 B	AP GREATER THAN LEVEL 3			A	T	X		LEAD-IN
87 B	The ITWS shall have the following update rates for its products: EVERY 30 SECONDS			A	X	T		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
88 B	PERFORMANCE CHARACTERISTICS							LEAD-IN
89 C	The ITWS shall meet the following performance characteristics (read as Source/Maximum Number): NEXRAD/1, TDWR/4, LLWAS/4, ASR-9 Wx Channel/5, ADAS/1, NMC/1, MPS(CTS)/1	T		T	T	D		
90 C	Microburst prediction map.							LEAD-IN
91 B	AP EQUAL TO OR GREATER THAN LEVEL 2			A	T	X		LEAD-IN
92 C	The ITWS shall provide a precipitation map	D		D	X	D		
93 B	RUNWAY LOCATION ACCURACY			T	T	X		LEAD-IN
94 D	The project specifications shall specify the response time requirements for detection of alarms and alerts;			I	I			
95 B	ITWS PRECIP MAP WITH AP REMOVED							LEAD-IN

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
96 B	FUNCTIONAL CHARACTERISTICS			L	L	L		LEAD-IN
97 C	The ITWS shall have an update rate for a terminal weather text message of every minute, under non-hazardous weather conditions, within 15 NMI of the ARP and every 10 minutes otherwise.	A		D	X	A		
98 B	CHARACTER GRAPHICS MESSAGE			A	X	T		
99 B	ALPHANUMERIC MESSAGE			A	X	T		
100 B	TERMINAL WEATHER TEXT MESSAGE							LEAD-IN
101 B	COVERAGE AREA FOR WEATHER PRODUCTS							LEAD-IN
102 B	LOCATION OF WEATHER			X	X	X		LEAD-IN
103 C	The ITWS shall have an update rate of every minute for Storm motion map/Storm extrapolated position map, Storm cell information, Microburst prediction map, Gust front map;	T		T	X	D		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
104 C	The ITWS will provide a precipitation map with the performance requirement that the ITWS shall edit out 70% of the AP exceeding level 3 reflectivity when the actual weather reflectivity is < = 18dBZ and the spatial extent of the AP exceeds 25 km2 within t	T		T	X	I		
105 D	For 3.1.1.1.1.9.2.5.2.5. of NAS SS-1000 , for each of the transactions, two response times shall be specified: average response time and maximum response time.	I		I	X	I		
106 B	TERMINAL CHARACTER GRAPHICS MESSAGE			D	D	X		LEAD-IN
107 C	The ITWS shall generate a character graphics product including the Airport Location.	T		T	X	D		
108 B	WEATHER DATA PROCESSING							LEAD-IN
109 B	FUNCTIONAL/PHYSICAL INTERFACES	X		X	X	X		LEAD-IN
110 C	The map shall be 15 NMI in the horizontal and vertical directions, with range indicators every 5 NMI;	T		T	X	D		
111 C	The ITWS shall generate the following alphanumeric weather products: Microburst prediction message/alert, Gust front message/alert, Tornado message/alert,Terminal weather text message	T		T	X	D		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
112 B	VELOCITY OF WEATHER			X	X	X		LEAD-IN
113 B	TERMINAL WINDS			A,T	T	X		LEAD-IN
114 C	The ITWS shall generate a character graphics product including a Map scale in nautical miles.	T		T	X	D		
115 C	The ITWS shall acquire and transfer weather products within 30 seconds after receipt of all the source data required to produce the product.	T		T	X	D		
116 B	ALPHANUMERIC EXPECTED START TIME ACCURACY			A,T	T	X		
117 C	The ITWS shall have an update rate of every 6 minutes for Tornado map, Long range precipitation map, Long range storm motion	T		T	X	D		
118 B	TYPE OF WEATHER			X	X	X		LEAD-IN
119 C	The ITWS shall provide a precipitation map with the performance requirements that the ITWS shall edit out 90% of the AP grater than or equal to level 2 reflectivity during clear air conditions when the spatial extent of the AP exceeds 50 km2	T		T	X	I		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
120 D	For 3.1.1.1.1.9.2.5.2.5. of NAS SS-1000, the maximum response time shall be derived using the upper limit of the 95% confidence interval of the true average response time (assumes the response time will have a normal distribution with a standard deviation	A		A	X	A		
121 C	The ITWS shall have an update rate of every 5 minutes for Terminal winds;	T		T	X	D		
122 B	TIMELINESS			T	T	X		LEAD-IN
123 B	INTEGRATED TERMINAL WEATHER SYSTEM							LEAD-IN
124 B	GENERATE ALPHANUMERIC WX PRODUCTS							LEAD-IN
125 B	STORM CELL INFORMATION			A	A	X		LEAD-IN
126 B	GENERATE GRAPHICAL WEATHER PRODUCTS							LEAD-IN
127 C	The ITWS shall interface functionally and physically as shown in Figure 3.1.2.5.2.3-1. The ITWS functional interfaces are defined in Table 3.1.2.5.2.3-1.	T		X	T	I		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
128 C	The ITWS shall be capable of a probability of detection of at least 70%.	T/A		A	X	A		
129 B	DETECTION ACCURACY			A,T	T	X		LEAD-IN
130 C	The ITWS shall determine a smooth approximation to the edge of the precipitation region in the direction of the storm motion to lie within 1 NMI of the actual region over 80% of the leading edge region.	T		T	X	D		
131 C	The ITWS shall have an update rate for a terminal weather character graphics weather message of every 5 minutes , under hazardous weather conditions, within 15 NMI of the ARP and every 10 minutes otherwise.	T		T	X	D		
132 C	The displacement error due to ITWS computational inaccuracies for the leading edge displacement using the ITWS storm motion product shall be less than 1 km 95% of the time.	T		T	X	D		
133 B	FALSE ALARM RATE			A,T	T	X		LEAD-IN
134 B	WIND SPEED			A,T	T	X		LEAD-IN
135 B	SEVERITY OF WEATHER			X	X	X		LEAD-IN

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
136 A	The NAS shall perform all processing required to produce and/or complete a description of the current, trend, or predicted weather conditions overlaying and composition weather data to facilitate its operational use by NAS specialist and users.	T		T	X	D		
137 A	Generate weather products which support the interpretation of weather conditions by NAS specialists and users.	T		D	X	D		
138 A	Weather information classified as hazardous or potentially hazardous shall be available at the terminal within one minute from the time the NAS receives the hazardous weather information.	T		T	X	D		
139 A	Current alphanumeric and graphic weather information including hazardous weather and aeronautical information.	T		T	X	D		
140 A	Provide access to current, trend, or forecast weather information by location, route of flight, or geographic area.	T		T	X	D		
141 A	The NAS shall construct a real-time depiction of the weather conditions which affects, or has the potential to affect, the safe and efficient movement of aircraft at least every 15 minutes for each ATCT, ACF, ATCCC area of responsibility.	T		T	X	D		
142 A	Expired hazardous weather information shall be purged when the hazard no longer exists, no longer affects or has the potential to affect the safe and efficient movement of aircraft within on minute for terminal operations.	T		D	X	I		
143 A	Classify weather information as hazardous which may impact flight operations.	T		T	X	D		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
144 A	Maintain current, trend, and forecast weather information for the area of NAS responsibility.	T		T	X	D		
145 A	The NAS shall perform all processing required to produce and/or complete a description of the current, trend, or predicted weather conditions by using automated weather detection systems.	X		T	X	D		
146 A	Accept weather information from external subsystems that support NAS specialists and users.	T		D	X	I		
147 A	Current weather conditions aloft information shall be available to local area specialists and users and updated at least once every 5 minutes.	T		T	X	D		
148 A	Collect and/or sense weather information that pertains to the area of NAS responsibility for terminal and en-route operations.	T		T	X	D		
149 A	Forecast alphanumeric and graphic weather information.	T		D	X	D		
150 A	The NAS shall perform all processing required to produce and/or complete a description of the current, trend, or predicted weather conditions by filtering, decoding, editing and reformatting acquired weather data to facilitate its operational use by NAS s	T		T	X	D		
151 A	The NAS shall classify all weather information by location, route and/or geographic area to facilitate its use as weather information shall be available by location, weather-type, real time (current vs. forecast).	T		T	X	D		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
152 A	The NAS shall perform all processing required to produce and/or complete a description of the current, trend, or predicted weather conditions by deriving from raw data the products needed by NAS specialists and users.	T		T	X	D		
153 A	The NAS shall perform all processing required to produce and/or complete a description of the current, trend, or predicted weather conditions by expanding coded weather data into plain English.	X		T	X	D		
154 B	The ITWS shall provide weather data and products to determine the following: Type of weather;. Location of weather; Velocity of weather;. Severity of weather; Direction of storm movement; Near-term predictions of weather location.							Lead-In
155 A	The NAS shall construct a real-time depiction of the weather conditions which affects, or has the potential to affect, the safe and efficient movement of aircraft includes current condition and near-term predictions of the following: thunderstorm locatio	T		T	X	D		
156 B	Wind Shear							LEAD-IN
157 B	DATA SOURCES							LEAD-IN
158 B	TDWR			X	D	D		LEAD-IN
159 C	The ITWS shall accept TDWR weather radar products and base data from all the TDWRs within the ITWs coverage area via a direct link.	T		T	T	D		
160 B	TDWR Products			D	D	D		LEAD-IN

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
161 B	ITWS shall process information from TDWR	X		D	D	D		
162 B	TDWR PRODUCTS			D	D	D		LEAD-IN
163 B	MICROBURST PREDICTION PROBABILITY CORRECT			T	T	X		LEAD-IN
164 C	The ITWs shall report the gust front wind shear hazard, or headwind gain along a runway corridor, within +/- 5 knots or 20% whichever is greater.	T		T	X	I		
165 C	The ITWS shall issue an alert to provide a 1 minute warning for aircraft of an anticipated wind shear encounter in a runway corridor.	T		T	X	D		
166 B	WIND SHEAR ALERT GENERATION			A,T	T	X		LEAD-IN
167 C	The ITWS shall be capable of a probability of detection for wind shear of 90% measured on a runway corridor basis.	T		T	X	D		
168 B	MICROBURST LOSS ESTIMATE			T	T	X		LEAD-IN

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
169 B	MICROBURST PREDICTION MESSAGE/ALERT			D	D	X		LEAD-IN
170 C	Microburst detection map.							LEAD-IN
171 B	MICROBURST PREDICTION FALSE ALARM RATE			T	T	X		LEAD-IN
172 B	MICROBURST PREDICTION MAP							LEAD-IN
173 B	MICROBURST PROBABILITY OF DETECTION			T	T	X		LEAD-IN
174 C	The ITWS shall be capable of a probability of correct prediction of microbursts of at least 0.30 in the terminal area.	T		T	X	A		
175 C	The ITWS shall have an update rate of every 15 seconds for Microburst detection products	T		T	X	D		
176 B	MICROBURST DETECTION MAP							LEAD-IN

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
177 B	MICROBURST FALSE ALARM RATE			T	T	X		LEAD-IN
178 B	GUST FRONT DETECTION ACCURACY							LEAD-IN
179 B	MICROBURST PREDICTION			T	T	X		LEAD-IN
180 C	Gust front detection accuracy.							LEAD-IN
181 B	GUST FRONT MAP			D	D	X		LEAD-IN
182 C	The estimate of the location for a correct microburst prediction shall be to within +/-1.0 NMI, >/= 90% of the time.	T		T	X	I		
183 B	WIND SHIFT UPDATE RATE	T		T	X	D		LEAD-IN
184 B	Wind Shear Declaration			T	T	X		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
185 B	MICROBURST PRODUCTS			D	D	D		
186 B	Accuracy of Wind Shear Estimate			T	T	X		
187 C	The ITWS shall identify gust fronts and near-term predictions of their locations.	T		T	X	D		
188 C	The ITWS shall generate wind shear alerts if the gain in headwind is >/= 20 knots and the wind shear is >/= 10 knots/NMI.	T/A		T/A	X	T/A		
189 B	GUST FRONT DETECTION			D	D	D		
190 C	Upon issuing as alert for strong diverging shear, a countdown of 60 minutes shall begin.	T		T	X	D		
191 B	MICROBURST DETECTION MAP			D	D	X		LEAD-IN
192 C	The ITWS shall provide near-term prediction of microbursts; predictions microbursts.	T		T	X	D		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
193 C	The ITWS shall identify regions of strong diverging shear.	T		T	X	D		
194 C	The ITWS shall provide gust front detection within 48 NMI from the ARP.	T		D	X	I		
195 C	The ITWS shall determine the location of gust fronts within +/- 1.0 NMI along runway corridors.	T/A		T/A	X	T/A		
196 B	GUST FRONT MESSAGE/ALERT			D	D	X		LEAD-IN
197 B	ACCURACY OF WIND SHIFT ESTIMATE	T		T	X	D		LEAD-IN
198 C	The ITWS shall provide microburst products for the area from the surface to 1500 feet AGL from the ARP to 3 NMI from the end of each runway.	T		T	X	D		
199 B	Microburst detection/prediction			T	T	X		
200 B	LLWAS WINDS: LATENCY	T		T	D	D		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
201 B	LLWAS WINDS: UPDATE RATE	T		T	X	D		
202 B	LLWAS			X	D	D		LEAD-IN
203 B	LLWAS WINDS							LEAD-IN
204 C	The ITWS shall accept LLWAS products from all the LLWAS within the ITWS coverage area via an indirect link through the TDWR.	T		T	T	D		
205 B	LLWAS			D	D	D		LEAD-IN
206 B	ITWS shall process information from LLWAS	X		D	D	D		
207 C	The ITWS shall provide terminal winds information within a radius of 70 NMI around the ARP(s)3 and vertically to 23,000 feet AGL.	T		T	X	I		
208 B	Alphanumeric Alert Coverage			A	T	D		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
209 B	Alphanumeric Alert Coverage			T	T	X		
210 C	ITWS shall generate and update the Terminal Winds 2 minutes after the end of a data collection interval.	D		D	X	D		
211 B	UPDATE RATE	A		A	D	D		
212 B	ACCURACY							LEAD-IN
213 B	LATENCY	T		T	D	D		LEAD-IN
214 B	TERMINAL WINDS							LEAD-IN
215 C	The ITWS shall provide alphanumeric near-term prediction of microbursts.	T		T	X	D		
216 B	TERMINAL WINDS			D	D	D		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
217 B	ACCURACY WITH DOPPLER RADAR	T		T	X	D		
218 B	Alphanumeric Alert Timeliness			A	T	D		
219 B	TERMINAL WINDS			D	D	X		LEAD-IN
220 B	RESOLUTION							LEAD-IN
221 B	PROCESSING TIME FOR GEN. OF PROD.							LEAD-IN
222 C	The ITWS shall estimate the winds at various altitudes.	T		D	X	D		
223 C	The ITWS shall generate Alert Messages when prescribed threshold conditions occur.	T		T	X	D		
224 B	Microburst Declaration			T	T	X		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
225 B	WIND SPEED	T		T	X	D		
226 B	ACCURACY WITH AGFS DATA	T		T	X	D		
227 B	Coverage			T	T	X		
228 B	Ribon Display Alerts			T	T	X		
229 B	Location Accuracy			T	T	X		
230 B	ATIS Timers			D	D	D		
231 B	GUST FRONT WIND SHIFT ESTIMATE							LEAD-IN
232 B	Location Accuracy			T	T	X		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx #		DT+E	PAT+E	OT+E				Page: A 30
SrcDoc	Requirement Definition			Ops	Int	Shkdwn	Thresholds	Notes/Remarks
233 B	Gust Front Detection and Forecast							Lead-In
234 B	Timeliness of Divergent Wind Shear Estimate			T	T	X		
235 B	Accuracy of Divergent Wind Shear Estimate			T	T	X		
236 B	HORIZONTAL	T		T	X	D		
237 B	UPDATE RATE	T		T	X	D		
238 B	Coverage			A	T	D		
239 B	VERTICAL	T		T	X	D		
240 B	Timer Countdown Initiation	T		T	X	D		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
241 B	Display Update			T	T	X		
242 B	DISPLAY UPDATE	T		T	X	D		LEAD-IN
243 B	Timers			D	D	D		
244 B	Wind Shear Declaration			T	T	X		
245 B	TERMINAL WINDS			T	T	X		LEAD-IN
246 B	Timer Activation			T	T	X		
247 B	Display update			T	T	X		
248 B	GUST FRONT IMPACT	T		T	X	D		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
249 B	Detection Capability			T	T	X		
250 B	COVERAGE AREA	A		T	D	D		
251 B	MICROBURST PREDICTION MAP			D	D	X		LEAD-IN
252 B	Detection/Prediction Accuracy			T	T	X		
253 B	NEXRAD			X	D	D		LEAD-IN
254 A	Disseminate advisory information to the users as required utilizing the capabilities defined in 3.2.1.2.8 (Data Communications Performance Characteristics).	T		T	X	D		
255 B	TORNADO PRODUCT			A	T	X		LEAD-IN
256 C	NEXRAD shall provide the following products to ITWS: Storm structure, Storm tracking, Echo tops, Hail index, Mesocyclone, Tornadic vortex signiture, Mean radial velocity, Layered composite refectivity	T		T	X	D		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
257 C	The ITWS shall generate an alphanumeric product within a user-specified distance from the ARP for a Tornado Alert.	T		T	X	D		
258 B	ITWS shall accept NEXRAD weather radar products from the closest NEXRAD within 100 NMI of the ITWS airports ARP via direct link.	T		T	X	D		
259 B	ITWS shall process information from NEXRAD	X		D	D	D		
260 B	TORNADO PRODUCT			D	D	D		
261 C	The ITWS shall generate a graphical product using radar tornado detections.	T		T	X	D		
262 B	TORNADO MESSAGE/ALERT			D	D	X		LEAD-IN
263 C	The ITWS shall provide tornado information out to 40 NMI from the ARP4.	T		T	X	D		
264 C	The ITWS shall associate TORNADOS with real-time storms level 3 or higher from the ITWS precipitation map.	T		T	X	D		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
265 B	TORNADO DETECTION:							LEAD-IN
266 B	TORNADO DETECTION: LATENCY	T		T	D	D		
267 B	TORNADO DETECTION: COVERAGE AREA	A		T	D	D		
268 B	TORNADO DETECTION: ALERT GENERATION	T		T	X	D		
269 B	TORNADO DETECTION: DISPLAY ACCURACY	T		T	X	D		
270 C	The ITWS shall report the position of tornadoes within +/- 1 NMI.	T		T	X	D		
271 B	TORNADO MAP			D	D	X		LEAD-IN
272 C	The ITWS shall generate a character graphics product including the Storm Speed and Directions	T		T	X	D		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
273 C	The ITWS shall associate MESOCYCLONES with real-time storms level 3 or higher from the ITWS precipitation map.	T		T	X	D		
274 C	The ITWS shall use multiple radars to generate an ITWS precipitiation map with AP removed.	T		T	X	D		
275 B	MOSAIC MULTIPLE RADARS			D	D	X		LEAD-IN
276 C	The ITWS shall generate a text-based product including the following elements: Expected precipitation (Level 2 and above) impacts within the next 15 minutes	T		T	X	D		
277 C	There shall be two levels of precipitation, Moderate (Level 2) and Heavy (Level 3 and or higher).	T		T	X	D		
278 B	MESOCYCLONE			D	D	X		LEAD-IN
279 C	The ITWS shall generate a text-based product including the following elements: Storm speed and directions.	T		T	X	D		
280 B	STORM SPEED: LEADING EDGE SMOOTHING	T		T	X	D		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
281 B	STORM SPEED: ACCURACY	T		T	X	D		
282 B	STORM SPEED: UPDATE RATE	T		T	X	D		
283 C	Storm speeds shall be accurate to within 5 knots, 90% of the time and to +/- 10 degrees, 50% of the time for true speeds greater than 5 knots.	T		T	X	D		
284 B	STORM MOTION AND EXTRAPOLATED POSITION: STORM MOTION	D		D	X	D		
285 B	STORM CELL INFORMATION: UPDATE RATE	T		T	X	D		
286 B	STORM DIRECTION ACCURACY			A	T	X		LEAD-IN
287 B	STORM SPEED: STORM EXTRAPOLATED POSITION	D		D	X	D		
288 C	Storm motion map accuracy							LEAD-IN

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
289 B	200 NM RANGE PRECIPITATION							LEAD-IN
290 B	STORM SPEED: LATENCY	T		T	D	D		
291 C	Storm directions shall be accurate to +/- 20 degrees, 90% of the time and to +/- 10 degrees, 50% of the time for true speeds greater than 5 knots.	T		T	X	D		
292 C	The ITWS shall generate and provide a plan view of the ASR-9 weather reflectivity and the regions of AP ground clutter that were edited in forming the ITWS precipitation map for each ASR-9 radar(s) in ITWS coverage area;	T		T	X	D		
293 B	STORM SPEED: LATENCY	T		T	D	D		
294 B	STORM SPEED ACCURACY			A	T	X		
295 C	Storm extrapolated position map accuracy	T		T	X	D		LEAD-IN
296 B	STORM MOTION MAP ACCURACY							LEAD-IN

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
297 B	ASR-9 PRECIPITATION WITH AP FLAGGED							LEAD-IN
298 B	STORM SPEED: STORM SPEED ACCURACY	T		T	X	D		
299 B	LEADING EDGE SMOOTHING			A	T	X		LEAD-IN
300 B	ASR-9 PRECIP WITH AP FLAGGED			D	D	X		LEAD-IN
301 B	ASR-9 WEATHER CHANNEL			D	D	D		LEAD-IN
302 C	The ITWS shall accept ASR-9 weather channel output from all the ASR-9s within the ITWS coverage area via a direct link.	T		T	T	D		
303 B	STORM CELL INFORMATION: LATENCY	T		T	D	D		
304 B	STORM SPEED: STORM DIRECTION ACCURACY	T		T	X	D		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
305 B	ASR-9 PRECIPITATION WITH AP FLAGGED: COVERAGE AREA	A		T	D	D		
306 B	ASR-9 PRECIPITATION WITH AP FLAGGED: LATENCY	T		T	D	D		
307 B	ASR-9 PRECIPITATION WITH AP FLAGGED: UPDATE RATE	T		T	X	D		
308 B	ASR-9 PRECIPITATION WITH AP FLAGGED: ALERT	T		T	X	D		
309 B	ASR-9 PRECIPITATION WITH AP FLAGGED: RESOLUTION	T		T	X	D		
310 C	The ITWS shall highlight regions of AP when the contiguous region exceeds 5 NM2 within the ITWS coverage area.	T		T	X	I		
311 B	STORM MOTION AND EXTRAPOLATED POSITION: COVERAGE AREA	A		T	D	D		
312 B	STORM SPEED: STORM SPEED RESOLUTION	T		T	X	D		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx #		DT+E	PAT+E	OT+E				
SrcDoc	Requirement Definition			Ops	Int	Shkdwn	Thresholds	Notes/Remarks
313 B	STORM CELL INFORMATION: STORM CELL FEATURES	T		T	X	D		
314 B	STORM CELL INFORMATION: ASSOCIATION PERFORMAMCE	T		T	X	D		
315 B	INTENSITY THRESHOLD FOR GENERATION	T		T	X	D		
316 B	ITWS AND ASR-9 PRECIP MAP			T	T	X		LEAD-IN
317 C	The ITWS shall have an update rate of every 30 seconds for ITWS precipitation map with anomalous propagation (AP) removed, ASR-9 precipitation map with AP flagged, Airport lightning with warning light.	T		T	X	D		
318 B	STORM CELL INFORMATION							LEAD-IN
319 B	ITWS shall process information from ASR-9 WEATHER CHANNEL	X		D	D	D		
320 B	STORM EXTRAPOLATED POSITION MAP ACCURACY							LEAD-IN

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx #		DT+E	PAT+E	OT+E				
SrcDoc	Requirement Definition			Ops	Int	Shkdwn	Thresholds	Notes/Remarks
321 B	ASR-9 WEATHER CHANNEL			X	D	D		LEAD-IN
322 B	STORM SPEED: RESOLUTION	T		T	X	D		
323 B	STORM CELL INFORMATION: RANGE COVERAGE	A		T	D	D		
324 B	ASR-9 PRECIPITATION MAP WITH AP FLAGGED			A	T	X		
325 B	STORM MOTION AND EXTRAPOLATED POSITION							LEAD-IN
326 B	STORM SPEED: COVERAGE AREA	A		T	D	D		
327 B	STORM SPEED							LEAD-IN
328 B	ALPHANUMERIC EXPECTED PRECIP ACCURACY			A,T	T	X		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
329 C	ITWS shall generate and update the ITWS and ASR-9 precip map 15 seconds after ASR-9 Storm motion/Storm Extrapolated position plan view data is received.	D		D	X	D		
330 C	The ITWS precipitation map shall edit AP which exceeds the actual weather reflectivity by 2 or more levels and the AP spatial extent exceeds 25km2 within the ITWS coverage area by validating ASR-9 reflectivity with radar data.	T		T	X	D		
331 C	ITWS shall generate an ITWS precipitation map with anomalous propagation (AP) removed.	T		T	X	D		
332 C	The ITWS shall generate the velocity and direction of storms.	T		T	X	D		
333 B	LONG RANGE STORM MOTION			D	D	X		LEAD-IN
334 C	The ITWS shall generate a graphical map of reflectivity.	T		T	X	D		
335 C	The ITWS shall associate the radar and lightning products with real-time storms level 3 or higher from the ITWS precipitation map	T		T	X	D		
336 B	STORM CELL INFORMATION			D	D	X		LEAD-IN

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
337 B	PRECIPITATION							LEAD-IN
338 B	ECHO TOPS			D	D	X		LEAD-IN
339 C	The ITWS shall generate the velocity and direction of storms.	T		T	X	D		
340 B	HAIL			D	D	X		LEAD-IN
341 B	STORM MOTION MAP/STORM EXTRAPOLATED POSITION			D	D	X		LEAD-IN
342 B	EDIT AP			D	D	X		LEAD-IN
343 B	LONG RANGE PRECIPITATION MAP			D	D	X		LEAD-IN
344 B	5 NM RANGE PRECIPTITATION							LEAD-IN

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
345 C	The ITWS shall associate the HAIL with real-time storms level 3 or higher from the ITWS precipitation map.	T		T	X	D		
346 B	ITWS LONG RANGE PRECIP. PROD AND STORM			D	D	D		
347 B	ALTERNATIVE REFLECTIVITY	T		T	X	D		
348 B	ITWS PRECIP. PROD., STORM MOTION			D	D	D		
349 B	STORM MOTION/STORM EXTRAPOLATED POSITION			T	T	X		LEAD-IN
350 B	ITWS PRECIP MAP WITH AP REMOVED			D	D	X		LEAD-IN
351 C	Long range storm motion							LEAD-IN
352 B	COVERAGE AREA	A		T	D	D		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
353 B	RESOLUTION	T		T	X	D		
354 C	The ITWS shall provide long range precipitation reflectivity and storm motion information up to 200 NMI from the ARP2.	D		D	X	I		
355 B	LATENCY	T		T	D	D		
356 C	The ITWS shall provide precipitation reflectivity and storm motion information to the lesser of 1) a distance of 50 NMI from the ARP(s)1 and; 2) the maximum range of the available ASR-9 systems.	T		T	X	D		
357 A	Current surface weather observation information shall be available to local area specialists and users and updated at least once per minute.	T		T	X	D		
358 C	The ITWS shall accept all LPATS products via a direct link to the ADAS.	T		T	T	D		
359 B	LPATS			D	D	D		LEAD-IN
360 B	AIRPORT LIGHTNING WARNING: ACCURACY	T		T	X	D		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
361 A	Will receive and process current surface weather observation, at least once every minute.	T		T	X	I		
362 A	Current surface weather observation information shall be available to non-local area specialists and users and updated at least once per hour.	T		T	X	D		
363 B	ADAS			D	D	D		LEAD-IN
364 B	AIRPORT LIGHTNING WITH WARNING LIGHT			D	D	D		
365 C	The ITWS shall accept on minute AWOS/ASOS surface observations via a direct link to the ADAS	T		T	T	D		
366 C	The ITWS shall provide lightning information within a user-specified range around the ARP.	D		D	X	D		
367 B	ADAS			X	D	D		LEAD-IN
368 B	AIRPORT LIGHTNING WARNING: UPDATE RATE	T		T	X	D		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
369 B	AIRPORT LIGHTNING WITH WARNING LIGHT			A	A	X		LEAD-IN
370 B	AIRPORT LIGHTNING WARNING							LEAD-IN
371 B	ITWS shall process information from ADAS	X		D	D	D		
372 B	AIRPORT LIGHTNING WARNING: COVERAGE AREA	A		T	D	D		
373 C	The ITWS shall not degrade the accuracy of lightning stroke data locations by more than 0.25 NMI from that received from the sensor.	A		A	X	A		
374 B	NMC			D	D	D		LEAD-IN
375 B	NMC			X	D	D		LEAD-IN
376 B	ITWS shall process information from NMC	X		D	D	D		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
377 C	The ITWS shall accept national gridded weather data and Meteorological Data Collection and Reporting System (MDCRS) products from the National Meteorological Center (NMC) which will broadcast via FAATSAT.	T		T	T	D		
378 B	AIRPORT LOCATION	D		D	X	D		
379 B	CHARACTER GRAPHICS PRODUCT							LEAD-IN
380 C	The ITWS shall generate a character graphics product including the Airport code and Universal Time	T		T	X	D		
381 C	The ITWS shall generate a text-based product including the following elements: Current runway impacts due to microbursts, gust fronts, and precipitation	T		T	X	D		
382 B	UPDATE RATE							LEAD-IN
383 B	PREVIOUS MICROBURST IMPACTS	D		D	X	D		
384 C	The ITWS shall generate a text-based products	T		T	X	D		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
385 B	NEAR-TERM PREDICTIONS OF WEATHER LOCATION			X	X	X		LEAD-IN
386 B	PREVIOUS MICROBURST IMPACTS	D		D	X	D		
387 B	RUNWAY CONFIGURATION	T		T	X	D		
388 B	WEATHER WITHIN 15 NM	D		D	X	D		
389 B	TEXT-BASED PRODUCT							LEAD-IN
390 C	The ITWS shall generate Character Graphic messages.	T		T	X	D		
391 B	ACCURACY REQUIREMENTS							LEAD-IN
392 B	STORMS WITHIN 15 NM	D		D	X	D		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx #		DT+E	PAT+E	OT+E				Page: A 50
SrcDoc	Requirement Definition			Ops	Int	Shkdwn	Thresholds	Notes/Remarks
393 B	RUNWAY IMPACTS	D		D	X	D		
394 B	STORMS WITHIN 15NM	D		D	X	D		
395 B	RUNWAY IMPACT	D		D	X	D		
396 B	MAP RANGE	D		D	X	D		
397 B	DIRECTION OF STORM MOVEMENT	D		X	X	X		LEAD-IN
398 B	AIRPORT CODE	D		D	X	D		
399 B	EXPECTED PRECIPITATAION IMPACTS	D		D	X	D		
400 B	AIRPORT CODE	D		D	X	D		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
401 B	TERMINAL WEATHER TEXT MESSAGE			D	D	D		
402 C	The ITWS shall generate text messages which summarize the weather situation in the terminal area for use by pilots in various stages of flight in accordance with the following: Alphanumeric messages and Character Graphics messages.	T		T	X	D		
403 B	STORM MOTION	D		D	X	D		
404 B	TERMINAL WX TEXT MESSAGE			D	D	X		LEAD-IN
405 C	The ITWS shall generate a text-based product including the following elements: Airport code and Universal Time.	T		T	X	D		
406 B	EXPECTED PRECIPITATION IMPACTS	D		D	X	D		
407 C	The ITWS shall provide terminal weather text messages summarizing the weather activity occurring within 15 NMI for each ITWS ARP	T		D	X	I		
408 B	TERMINAL CHARACTER GRAPHICS MESSAGE			D	D	D		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
409 B	TERMINAL WEATHER TEXT MESSAGE							LEAD-IN
410 C	The ITWS shall be capable of archiving 15 days of generated products.	T		T	X	D		
411 B	ARCHIVING			T	D	X		LEAD-IN
412 A	Store data information for 15 days minimum.	T		T	X	D		
413 A	Archive weather information for use in event reconstruction and accident investigation.	D		D	X	A		
414 A	Disseminate weather and NOTAM information to NAS specialists and users in support of flight operations.	T		T	X	D		
415 A	The NAS shall archive all weather information in accordance with section Volume I paragraph 3.2.1.2.8.3.	T		T	X	D		
416 A	Alert specialists when hazardous weather or NOTAM information is received.	T		T	X	D		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
417 A	Record all specified operational voice and data information for support of analysis e.g., incident/accident investigation, search and rescue operations, or training activities.	X		T	X	D		ITWS will not support voice recording capabilities
418 A	Retrieve and playback all specified recorded data and voice information requested by an authorized specialists as follows: Voice recordings retrievable within 30 minutes from on-line storage and within 60 minutes from off-line storage.	T		T	X	D		ITWS will not support voice recording capabilities
419 A	Retrieve and playback all specified recorded data and voice information requested by an authorized specialists as follows: Data recordings retrievable from off-line storage.	T		T	X	D		ITWS will not support voice recording capabilities
420 A	The NAS shall provide data and voice recording and playback capabilities for archiving and reconstruction purposes.	D		D	X	D		ITWS will not support voice recording capabilities
421 A	The NAS shall provide the capability to determine and present alarms/alerts and state changes from NAS subsystems to NAS specialists with an average time of 14 seconds and a maximum time of 16 seconds.	T		T	X	D		
422 C	The ITWS shall be capable of a probability that an alarm is false less than 10%.	T		T	X	A		
423 A	Provide synchronization of non-ATC processors - A system dealing with non-ATC functions (e.g., maintenance, weather, traffic management, flight planning) shall be synchronized to within 6 seconds of UTC.	T		T	X	I		
424 B	MPS	A		A	D	D		LEAD-IN

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
425 B	MPS(CTS)			X	D	D		LEAD-IN
426 A	Provide interfaces to synchronization and coded time signal - The NAS shall provide interfacing capabilities to the coded time signal and synchronization in accordance with Volumes II through V of NAS-SS-1000.	T		T	X	I		
427 C	The ITWS shall receive and maintain timing synchronized to universal coordinated time to support system recording and maintenance and distribution of products	T		D	X	I		
428 B	STANDARD TIME REFERENCE			D	D	X		LEAD-IN
429 B	ITWS shall process information from MPS(CTS)	X		D	D	D		
430 B	PASS-THROUGH PROCESSING TIME			T	T	X		LEAD-IN
431 A	Air traffic control functional characteristics - Disseminate Advisory Information.			D	D	X		
432 B	ITWS shall disseminate information to the CWSU METEROLOGIST	A		A	D	D		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
433 B	The ITWS shall disseminate data and /or products to the MPS			D	D	X		
434 B	EXTERNAL USERS			D	D	X		LEAD-IN
435 B	DATA DISTRIBUTION							LEAD-IN
436 C	The ITWS shall implement the RMS functional characteristics as specified in Volume I, Appendix III of the NAS-SS-1000.	D		D	D	D		
437 B	The ITWS shall disseminate data and /or products to the EXTERNAL USERS			D	D	X		
438 B	DLP			D	D	X		LEAD-IN
439 B	REMOTE MAINTENANCE MONITORING			D	D	X		LEAD-IN
440 C	The ITWS shall disseminate weather products and alarm messages to the following: TCCC, DLP, External users, and Terminal automation systems	T		T	T	D		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
441 B	The ITWS shall disseminate data and /or products to the DLP			D	D	X		
442 B	DATA AND PRODUCT DISSEMINATION							LEAD-IN
443 C	The ITWS shall disseminate data and /or products to the following destinations (to be read as DESTINATION/MAXIMUM NUMBER): TCCC/4, DLP/2, ITWS Situation Display/3, MPS/1, ExternalUsers/1.	T		T	X	D		
444 B	The ITWS shall disseminate data and /or products to the ITWS ACF GSD			D	D	X		
445 B	The ITWS shall disseminate data and /or products to the TCCC			D	D	X		
446 C	Data and product dissemination.							LEAD-IN
447 A	Disseminate aeronautical/weather data to the user that directly affects flight operations	D		D	X	D		
448 B	DATA AND PRODUCT DISSEMINATION							LEAD-IN

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
449 B	ITWS shall disseminate information to the DLP	A		A	D	D		
450 B	EXTERNAL USERS	A		A	D	D		LEAD-IN
451 B	ACF DISPLAY CONFIGURATION			D	D	D		LEAD-IN
452 B	TRACON Display Configuration			I	I	I		
453 B	Tower Display Configuration			I	I	I		
454 C	Display requirements.							LEAD-IN
455 C	The ITWS shall provide color monitors supporting presentations of weather graphic products and radar displays.	I		I	I	I		
456 C	The ITWS displays shall accept and display TDWR products.	I		I	I	I		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
457 C	The ITWS will provide interactive display support for the ATC tower and TRACON supervisors and Traffic Managers to display weather products.	T		T	D	D		
458 B	Display Configuration			I	I	I		LEAD-IN
459 B	DISPLAY REQUIREMENTS							LEAD-IN
460 C	ITWS shall provide processing support to automatically receive, process, produce, and disseminate weather products to support ATC and CWSU personnel.			D	D	D		
461 C	The ITWS shall support the traffic management unit and the CWSU positions within the ACF with independently controlled color monitors providing a presentation of most of the weather products available via the ITWS or TDWR within the TRACON's airspace.	D		D	X	D		
462 A	Provide tabular and pictorial displays of weather information to support the specialists.	D		X	D	I		
463 C	The ITWS shall support the supervisory position and the traffic management position within the TRACON with independently controlled color monitors providing a presentation of any weather product available via the ITWS or TDWR within the TRACON's airspace.	D		D	X	D		
464 B	TOWER DISPLAY CONFIGURATION			D	D	D		LEAD-IN

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
465 C	The ITWS shall support the supervisory position within the Tower with independently controlled color monitors providing a presentation of any weather product centered around the towered airport's ARP.	T		T	X	D		
466 B	Display Requirements			D	D	X		LEAD-IN
467 B	TRACON DISPLAY CONFIGURATION			D	D	D		LEAD-IN
468 B	DISPLAY CONFIGURATION			D	D	D		LEAD-IN
469 B	MULTIPLE ITWS AIRPORTS			D	D	D		LEAD-IN
470 C	The ITWS displays in the ACF shall be capable of displaying up to 6 ITWS airports simultaneously.	T		T	X	I		
471 B	100 NM RANGE PRECIPITATION							LEAD-IN
472 B	TRACON RANGE PRECIPITATION: LOCATION	T		T	X	D		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx #		DT÷E	PAT÷E	OT÷E				Page: A 60
SrcDoc	Requirement Definition			Ops	Int	Shkdwn	Thresholds	Notes/Remarks
473 B	TRACON RANGE PRECIPITATION							LEAD-IN
474 B	TRACON RANGE PRECIPITATION: COVERAGE AREA	A		T	D	D		
475 B	TRACON RANGE PRECIPITATION: ALTERNATIVE PRECIPITATION REFLECTIVITY	T		T	X	D		
476 B	TRACON RANGE PRECIPITATION: UPDATE RATE	T		T	X	D		
477 B	TRACON RANGE PRECIPITATION: LATENCY	T		T	D	D		
478 B	TRACON RANGE PRECIPITATION: RESOLUTION	T		T	X	D		
479 B	TRACON RANGE PRECIPITATION: AP EDITING	T		T	X	D		
480 D	The RMS shall declare an alert condition when a performance parameter value is outside the normal operating range but inside the acceptable operating range;	T		T	D	D		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
481 D	Subsystem monitoring function.							LEAD-IN
482 D	The RMS shall not allow the data sensing to interfere with other functions of the RMS or monitored subsystem(s);	T		T	I	D		
483 D	The RMS shall declare a state change condition when a mode, configuration, or threshold parameter value of the monitored subsystem changes;	T		T	D	D		
484 D	The RMS shall perform a discriminating function to minimize the declaration of alarms and alerts caused by transient conditions;	T		T	T	D		
485 D	The RMS shall transfer a maintenance status change, for a declared condition, only once to the MDT;	T		T	T	D		
486 D	The RMS shall provide a dedicated serial port for interfacing with the MPS;	I		X	I	I		
487 D	The RMS shall transfer to the MDT only the overall subsystem status for the standby equipment;	T		T	T	D		
488 B	MAINTENANCE MONITORING			D	D	X		LEAD-IN

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
489 D	Subsystem RMS.Acknowledgement (1 sec ave - max 3 sec)Response Time (2 sec ave - max 4 sec)	T		T	T	D		
490 D	The RMS shall transfer to the MDT an error indication for each invalid maintenance status command and performance data command received from the MDT;	T		T	T	D		
491 D	The RMS shall collect, process security access data transferred from the MDT;	T		T	T	D		
492 D	The RMS shall authenticate specialist access	T		T	T	D		
493 D	The RMS shall declare a normal condition when a performance parameter is within its normal operating range;	T		T	D	D		
494 D	The maximum response time shall be derived using the upper limit of the 95% confidence interval of the true average response time (assumes the response time will have a normal distribution with a standard deviation of 1 second.)	T		T	A	D		
495 D	The RMS shall transfer to the MPS, maintenance status changes as the changes occur;	T		T	T	D		
496 D	The RMS shall determine the overall subsystem status for both primary and standby equipment;	T		T	T	D		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
497 D	The RMS shall transfer to the MPS only the overall subsystem status for the standby equipment;	T		T	T	D		
498 A	The NAS shall provide the specialist access to the monitoring, control, and data management capabilities of the NAS.	X		T	X	D		
499 D	The RMS shall collect, validate, and execute maintenance status commands and performance data commands transferred from the MDT;	T		T	A	D		
500 D	Subsystem Control Function.							Lead-In
501 D	The RMS shall transfer maintenance status data and performance data to the MDT upon request;	T		T	T	D		
502 D	The RMS shall collect derived data from the monitored subsystem(s);	T		T	T	D		
503 D	The RMS shall maintain synchronization of the monitored subsystem(s) clock to within 4 seconds of the clock sync data provided by the MPS;	T		T	X	D		
504 D	The RMS shall transfer to the MDT, maintenance status changes as the changes occur;	T		T	T	D		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx #		DT+E	PAT+E	OT+E				Page: A 64
SrcDoc	Requirement Definition			Ops	Int	Shkdwn	Thresholds	Notes/Remarks
505 D	The RMS shall declare an overall subsystem status change condition when the overall subsystem status changes;	T		T	D	D		
506 D	The RMS MDT shall initiate subsystem diagnostic tests on an automatic basis;	T		T	D	D		
507 D	The RMS shall transfer diagnostic test results to the MPS upon request;	T		T	D	D		
508 D	The RMS shall transfer diagnostic test results to the MDT upon request.	T		T	D	D		
509 D	The RMS shall collect, validate, and execute maintenance status commands and performance data commands transferred from the MPS;	T		T	A	D		
510 D	The RMS shall transfer maintenance status data and performance data to the MPS upon request;	T		T	T	D		
511 D	The RMS shall set the MDT clock to the subsystem clock when a connection is established;	T		T	T	D		
512 D	The RMS will contain the hardware and software necessary to perform the NAS maintenance operations function.	T		T	I	D		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
513 D	RMMS Subsystem AMCCWS.Request (ave 1 sec max 3 sec)Acknowledgement (1 sec ave - max 3 sec)Response Time (1 sec ave - max 3 sec)	T		T	T	D		
514 D	Subsystem GMCCWS.Request (ave 1 sec max 3 sec)Acknowledgement (1 sec ave - max 3 sec)Response Time (1 sec ave - max 3 sec)	T		T	T	D		
515 D	The RMS shall declare an alarm condition when a performance parameter value is outside the acceptable operating range.	T		T	D	D		
516 D	The RMS shall have the capability to interface with commercial telephone network;	I		X	I	X		
517 D	The RMS shall provide indications of alarm, alert, return-to-normal, state change, and overall subsystem status conditions in the monitored subsystem within an average time of 2 seconds and a maximum time of 4 seconds.	T		T	X	D		
518 D	Subsystem MDT. Request (avg 1 sec max 3sec); Acknowledgement (1 sec avg 3 sec max); Response time ((1 sec avg 3 sec max)	T		T	T	D		
519 D	The RMS shall transfer to the MPS an error indication for each invalid maintenance status command and performance data command received from the MPS;	T		T	T	D		
520 D	The RMS shall interface both functionally and physically as shown in Figure 3.2.1.1.1.3-1. The RMS functional interfaces are defined in Table 3.2.1.1.1.3-1. The RMS shall have the following functional and physical interfaces:	I		X	I	I		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
521 DD	The RMS shall transfer a maintenance status change, for a declared condition, only once to the MPS;	T		T	T	D		
522 A	The NAS shall provide the specialist the capability to identify the line replaceable unit causing an equipment failure	T		T	X	D		
523 B	MAINTENANCE MONITORING	T		T	D	D		LEAD-IN
524 D	The RMS shall collect, process, and store security access data from transferred from the MPS;	T		T	T	D		
525 D	The RMS shall transfer security access data to the MPS;	T		T	T	D		
526 D	Subsystem MPS.Request (ave 2 sec max 4 sec) Acknowledgement (2 sec ave - max 4 sec)Response Time (2 sec ave - max 4 sec)	T		T	T	D		
527 A	The NAS provide the status of subsystems to specialists and shall generate an alarm upon the deviation of designated parameters from prescribed limits	T		T	X	D		
528 D	The RMS shall meet the performance requirements response time specified in 3.1.1.1.1.9.2.5.2.5 and 3.1.1.1.1.9.2.6.2.4 of NAS-SS-1000 Volume I.							Lead-In

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx #		DT+E	PAT+E	OT+E				
SrcDoc	Requirement Definition			Ops	Int	Shkdwn	Thresholds	Notes/Remarks
529 D	Performance criteria for certification data, diagnostic test data, monitored parameter data, or facility data) for a single report for each RMMS subsystem shall be as specified in (NAS-SS-1000 Vol I, 3.1.1.1.1.9.2.5.2.3-1).	T		T	X	D		
530 D	The RMS shall provide a standard telephone port for the purpose of communicating with the MPS;	I		X	I	I		
531 D	Each of the transactions, two response times shall be specified: average response time and maximum response time	T		T	T	D		
532 A	The NAS shall provide the capability for a specialist on-site or at an off-site location to control selected subsystems for maintenance purposes.	T		T	X	D		
533 D	The RMS shall meet the performance requirements response time specified in 3.1.1.1.1.9.2.5.2.5 and 3.1.1.1.1.9.2.6.2.4 of NAS-SS-1000 Volume I.							Lead-In
534 A	The NAS shall continually monitor subsystem performance to obtain the data needed by specialists for maintenance and operations support.	T			T	D		
535 D	The RMS shall provide a dedicated serial port for interfacing with the MDT;	I		X	I	I		
536 D	The subsystem clock shall not require clock resync for a period of at least 24 hours;	D		X	D	X		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
537 D	The RMS shall have the capability to automatically dial a telephone number for establishing communication linkage with the MPS;	I		X	I	X		
538 A	Event reconstruction for incident and/or accident investigation.	X		D	X	I		
539 D	The RMS function shall not interfere with any other functions of the subsystem it is monitoring.	I		I	X	I		
540 D	For 3.1.1.1.1.9.2.6.4, the response time shall be measured under the peak hour transaction loading in table 3.1.1.1.1.9.2.7.2.3-1.	T		T	A	D		
541 D	The RMS shall automatically perform subsystem clock synchronization with the MPS;	T		T	T	D		
542 C	The ITWS shall meet the maintenance monitoring performance characteristics listed in 3.2.1.1.1.2 of Volume V of the NAS-SS-1000.	T		T	X	D		
543 B	GROWTH AND FLEXIBILITY			X	X	X		LEAD-IN
544 C	The ITWS shall provide the capability to expand to disseminate weather products and alarm messages to additional subsystems and support future interfaces	T		A	X	A		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx # / SrcDoc	Requirement Definition	DT+E	PAT+E	OT+E Ops	OT+E Int	OT+E Shkdwn	Thresholds	Notes/Remarks
545 A	Provide the capacity and flexibility to support future growth and expandability.	T		T	X	A		
546 B	ITWS Display Expansion			D	D	X		LEAD-IN
547 B	ITWS Computer Processing Power Expansion			D	D	X		LEAD-IN
548 B	AIRPORT LIGHTNING WITH WARNING LIGHT			D	D	X		LEAD-IN
549 C	The ITWS shall associate LIGHTNING with real-time storms level 3 or higher from the ITWS precipitation map.	T		T	X	D		
550 B	LIGHTNING			D	D	X		LEAD-IN
551 C	The ITWS shall determine if a cloud-to-ground lightning strike occurred within a user-specified distance from the airport.	T		T	X	D		
552 J	Each SD shall have a pointing device: either a trackball or a mouse.			T		D		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

Mtrx #		DT+E	PAT+E	OT+E				
SrcDoc	Requirement Definition			Ops	Int	Shkdwn	Thresholds	Notes/Remarks
553 J	The pointing device shall have three buttons.			T		D		
554 J	The SD shall respond in some way to every click of a mouse button.			T		D		
555 J	When the click (i.e., the combination of the mouse cursor location and the specific mouse button that is pressed) constitute one of the commands described in this document then the SD shall respond by carrying out the command.			T		D		

Requirement Source: A=SS-1000 Vol I, B=SS-1000 Vol II (High Level); C=SS-1000 Vol II (Low Level); D=SS-1000 Vol V; E=MAOPR; F=Exit Criteria; G=CPP; H=COI, J=Diplay Spec, K=Algor Spec, L=A-Spec, M=SOW

Verification Method: T=Test; D=Demonstration; A=Analysis; I=Inspection; L=Verified by lower layer; X=Not applicable

APPENDIX B
SCHEDULE

Task Name	Start Date	Duratn (Wks)
HUMAN FACTORS PLAN	Mar 95	0
KDP-3 ARC	Apr 95	0. 2
- Acquisition Plan Approved	Apr 95	0. 2
- FAA TEMP	Apr 95	0
- KDP-3 TSARC	May 95	0. 2
- "A" Specification Approved	Jun 95	0. 2
- Statement of Work Approved	Jun 95	0. 2
- Data Requirements Approved	Jun 95	0. 2
- RFP Release	Aug 95	0. 2
- Contract Award	Aug 96	0. 2
- CONTRACTOR'S MASTER TST PLN	Sep 96	28. 8
- SRR	Oct 96	0. 4
- SDR	Dec 96	0. 4
KDP-3 PDR	Apr 97	0. 4
- CDR	Oct 97	0. 4
- S/W TEST PLAN	Oct 97	28. 2
- DT&E FAT/SAT PLAN	Dec 97	36. 2
- IC&A TEST PLAN	Dec 97	36. 2
- FAA OT&E I/O TEST PLAN	Feb 98	30
- FAA OT&E SHAKEDOWN TEST PLN	Feb 98	30
- TRR	Mar 99	0. 4
- DT&E FAT	Mar 99	8
- PCA	Apr 99	1
- FCA	Apr 99	1
- Ship & Install 1st Article	May 99	2
- DT&E SAT AT FAATC	Jun 99	8
- SIMPLE SITE SAT	Jul 99	6
- COMPLEX SITE SAT	Jul 99	6
- OT&E (I/O) AT FAATC	Aug 99	7
- SIMPLE SITE OT&E (I/O)	Sep 99	6
- SIMPLE SITE SHAKEDOWN	Oct 99	3
- COMPLEX SITE OT&E (I/0)	Oct 99	6
- COMPLEX SITE SHAKEDOWN	Nov 99	3
- IOT&E	Dec 99	4
- DRR	Dec 99	0. 4
KDP-4 ARC	Feb 00	0. 2
- KDP-4 TSARC	Apr 00	0. 2
- PAT&E FAT/SAT TEST PLAN	Apr 00	15
- PAT&E FAT	Jun 00	65
- PAT&E SAT	Jul 00	65
- PAT&E Shakedown	Aug 00	65
- Field Shakedown/IOC	Sep 00	65
- JAI	Sep 00	0. 2
- ORD	Oct 00	65